

CURRICULUM VITAE

of

ANDREAS MANDELIS F.R.S.C., F.A.P.S., F.S.P.I.E., Ph.D.

Canada Research Chair (Tier I) in Diffusion-Wave Sciences and Technologies

mandelis@mie.utoronto.ca

<http://www.mie.utoronto.ca/cadift>

Tel/Fax: 416-978-5106

Direct on-line access to CV: <http://cadift.mie.utoronto.ca/Mandelis-CV.pdf>

Ia. PERSONAL INFORMATION

- 1. Date of Birth:** June 22, 1952 **Revised Date:** April 9, 2012
- 2. Rank:** Full Professor of Mechanical, Industrial, Electrical and Computer Engineering, and Biomaterials and Biomedical Engineering

3. Education

| Degree | Institution | Department | Thesis Field | Year |
|---------------------------|---|---|--|------|
| B.S. (Magna cum Laude) | Yale University (Fullbright Scholar) | Physics | High Energy Particle Scattering | 1974 |
| M.A. | Princeton University | Mechanical Aerospace Engineering (M.A.E.) | | 1976 |
| M.S.E. | Princeton University | M.A.E. Applied Physics Lab | Thermal Decomposition of Electronically Metastable Materials (Solid State Science) | 1977 |
| Ph.D. | Princeton University | M.A.E. Applied Physics Lab | Applied Physics; Photoacoustic/ Photothermal Science | 1979 |

Ib. POSITIONS HELD

| Institution | Department | Position | Year |
|--|------------------------|-------------------------|---------|
| 1. Bell Northern Research Ottawa, Canada | Silicon Process R&D | Member Scientific Staff | 1980-81 |
| 2. University of Toronto | Mechanical Engineering | Assistant Professor | 1982-86 |
| 3. University of Toronto | Mechanical Engineering | Associate Professor | 1986-90 |
| 4. Eidg. Technische Hochschule Lausanne, Switzerland (EPFL) | Chemistry | Invited Professor | 1988-89 |

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|---|--|---|-----------|
| 5. University of Toronto | Mechanical and Industrial Engineering | Full Professor | 1990- |
| 6. University of Toronto | Electrical & Computer Engineering | Full Professor (Cross-Appointment) | 1990 - |
| 7. University of Cyprus | Natural Sciences | Visiting Professor of Solid-State Physics | 1995-96 |
| 8. University of Toronto | Mechanical and Industrial Engineering | Associate Chair, Graduate Studies | 2000-02 |
| 9. University of Toronto | Mechanical and Industrial Engineering | Director, Center for Advanced Diffusion-Wave Technologies | 2003- |
| 10. Ruhr Universitaet Bochum | Dept. Of Physics, Festkoerperspektroskopie III | Visiting Professor; A. von Humboldt Award research leave | 2003-04 |
| 11. University of Toronto | Institute of Biomaterials and Biomedical Engineering | Full Professor (Cross-Appointment) | 2008 - |
| 12. Cyprus Institute – Cyprus Research and Educational Foundation | | Professor (Status only) | 2008 – 10 |
| 13. Professional Engineers Ontario | | PEO Ltd Eng Licensee | 2008 - |
| 14. Canada Research Chair (Tier 1) | | | 2008 - 15 |

I. RESEARCH ACHIEVEMENT AND INVENTION HIGHLIGHTS

1. Pioneered Photopyroelectric Spectroscopy (PPES) and Detection and the physics of the photopyroelectric effect (1983): AIP PACS number *78.20.nc* was assigned to “photopyroelectric effects” in 2007.
2. Pioneered frequency-modulated (FM) time-dealy photothermal detection and the photothermal-wave radar (1986-2009).
3. Pioneered Photocarrier Radiometry (PCR) of semiconductors (2003): AIP PACS number *78.56.Cd* was assigned to “photocarrier radiometry” in 2009.
4. Pioneered (with Jun Shen) the Thermal-Wave Cavity sensor (1996)
5. Pioneered the Common Mode Rejection Demodulation (CMRD) contrast amplification technique as a platform signal generation and processing methodology of optimal contrast dynamic range for solid-state defect imaging, fluid pollutant monitoring and non-destructive evaluation of industrial materials (2000)
6. Pioneered (with Ying Fan and Sergey Telenkov) the photothermoacoustic radar or sonar for subsurface tissue imaging (2006)
7. Introduced the physics of the thermal-wave inverse problem (1985) and the first photothermal inverse problem imaging technique (thermal-wave tomography, 1997).
8. First photothermal radiometric rate-window application to optoelectronic materials (1993)
9. Pioneered (with Jun Xia) Deep-Level Photo-Thermal Spectroscopy of defects and impurities in semiconductors (2007): AIP PACS number *79.10.Ca* was assigned to “Deep-level photothermal spectroscopy” in 2009.
10. First application of thermal-wave inverse problems to industrial steel hardness depth profiles (1991) with applications to the aerospace, automotive, thermal-barrier coating, and steel heat treating industries.
11. First hybrid (chirp modulation) photothermal detection methods for subsurface defects in solids (1986)
12. First photothermal radiometry and modulated luminescence application to early caries detection in dental enamel (2000).
13. First all-optical hydrogen sensor (1989).
14. Pioneered (with Nima Tabatabaei) the Thermal-Wave Radar (TWR; 2009); Thermal-Wave Radar Imaging (TWRI; 2011); Thermophotonic Lock-in Imaging (TPLI; 2010)
15. Pioneered (with Nima Tabatabaei) Thermal-Wave Coherence Tomography (Thermophotonic Chirp Scan and Binary Phase Code Imaging; 2011)

Web of Science (Hirsch) *h* index (February 2012): 33

Google Scholar (Hirsch) *h* index (January 2012): 37

II. SCIENTIFIC AND TECHNICAL PUBLICATIONS

1. Refereed Journal Publications

(In reverse chronological order and by research theme areas)

Total Refereed Journal Publications to-date:

316

I. Thermophysical and Thermodynamic Properties using Thermal-Wave Measurements

27. **(Invited Review Article)** A. Mandelis, "Photopyroelectric effects and pyroelectric measurements: "Invited Review Article: Photopyroelectric calorimeter for the simultaneous thermal, optical and structural characterization of samples over phase transitions" [Rev. Sci. Instrum. **82**, 121101 (2011)]" Rev. Sci. Instrum. **82**, 120901 (2011); doi:10.1063/1.3669517 (4 pages)
26. C. Wang, A. Mandelis, H. Qu and Z. Chen, "Influence of laser beam size on measurement sensitivity of thermophysical property gradients in layered structures using thermal-wave techniques", J. Appl. Phys. **103**, 043510 (1-8), 2008.
25. A. Matvienko and A. Mandelis, "Quantitative one-dimensional thermal-wave cavity measurements of fluid thermophysical properties through equivalence studies with three-dimensional geometries", Rev. Sci. Instrum. **77**, 064906 (1 – 9) (2006). *Paper selected for inclusion in Virtual Journal of Biological Physics Research (www.vjbio.org)*, **12** (1) 064906 (1 - 9), July 1, 2006.
24. A. Bendada, N. Baddour, A. Mandelis and C. Moreau, "Experimental investigation on the reliability of thermal wave interferometry in the thermophysical characterization of plasma sprayed coatings", Int. J. Thermophys. **26** (3), 881 – 892 (May 2005).
23. A. Matvienko and A. Mandelis, "High-precision and high-resolution measurements of thermal diffusivity and infrared emissivity of water-methanol mixtures using a pyroelectric thermal-wave resonator cavity: frequency-scan approach" Int. J. Thermophys **26** (3), 837 – 854 (May 2005).
22. J. A. Balderas-Lopez and A. Mandelis, "New Photopyroelectric Technique for Precise Measurements of the Thermal Effusivity of Transparent Liquids", Int. J. Thermophys. **24** (2), 463 - 471 (March 2003).
21. J. A. Balderas-Lopez and A. Mandelis, "Self-normalized photothermal technique for accurate thermal diffusivity measurements in thin metal layers", Rev. Sci. Instrum. **74** (12), 5219 - 5225 (December 2003).
20. J. A. Balderas-Lopez and A. Mandelis, "Self-consistent photothermal techniques: Application for measuring thermal diffusivity in vegetable oils", Rev. Sci. Instrum. **74** (1), 700 - 702 (January 2003).
19. J. A. Balderas, A. Mandelis and J. A. Garcia, "Normalized Photoacoustic Techniques for Thermal Diffusivity Measurements of Buried Layers in Multi-Layered Systems", J. Appl. Phys. **92** (6), 3047 - 3055 (15 September 2002)
18. J. A. Balderas-Lopez and Andreas Mandelis, "Thermal diffusivity measurements in liquids using signal common-mode-rejection demodulation in a thermal-wave cavity", J. Appl. Phys. **90** (7), 3296-3300 (1 October 2001).
17. J. A. Balderas-Lopez and A. Mandelis, "Thermal Diffusivity Measurements in the Photoacoustic Open-Cell Configuration using Simple Signal Normalization Techniques", J. Appl. Phys. **90** (5), 2273-2279 (1 September 2001).
16. J. A. Balderas-Lopez and A. Mandelis, "Self-Normalized Photothermal Techniques for Thermal Diffusivity Measurements", J. Appl. Phys. **88** (11), 6815 - 6820 (1 December 2000).

15. J. A. Balderas-Lopez, A. Mandelis and J. A. Garcia, "Thermal-Wave Resonator Cavity Design and Measurements of the Thermal Diffusivity of Liquids", *Rev. Sci. Instrum.* **71** (7), 2933-2937 (July 2000).
14. J. A. Garcia, A. Mandelis, B. Farahbakhsh, C. Lebowitz and I. Harris, "Thermophysical Properties of Thermal Sprayed Coatings on Carbon Steel Substrates by Photothermal Radiometry", *Int. J. Thermophys.* **20**, Number 5, 1587-1602 (1999).
13. C. Wang and A. Mandelis, "Measurement of Thermal Diffusivity of Air using Photopyroelectric Interferometry", *Rev. Sci. Instrum.* **70**, Number 5, 2372-2378, May 1999.
12. G. Pan and A. Mandelis, "Measurements of the Thermodynamic Equation of State via the Pressure Dependence of Thermophysical Properties of Air by a Thermal-Wave Resonant Cavity", *Rev. Sci. Instrum.* **69**, Number 8, 2918-2923, August 1998.
11. J. Shen, A. Mandelis and H. Tsai, "Signal Generation Mechanisms, Intracavity-Gas Thermal-Diffusivity Temperature Dependence, and Absolute IR Emissivity Measurements in a Thermal-Wave Resonant Cavity", *Rev. Sci. Instrum.* **69**, No. 1, 197-203, January 1998.
10. A. Mandelis, M. Nestoros, A. Othonos and C. Christofides, "Thermophysical characterization of Commercial Paper by Use of Laser Infrared Radiometry", *J. Pulp Paper Sci.* **23**, J108-J112, March 3, 1997.
9. E. MacCormack, A. Mandelis, M. Munidasa, B. Farahbakhsh and S. Sang, "Measurements of the Thermal Diffusivity of Aluminum Using Frequency-scanned, Transient- and Rate-Window Photothermal Radiometry. Theory and Experiment", *Int. J. Thermophys.* **18** (1), 221-250, January 1997.
8. M. Munidasa and A. Mandelis, "Comparison Between Conventional Photothermal Frequency Scan and the Lock-in Rate Window Method in Measuring Thermal Diffusivity of Solids", *Rev. Sci. Instrum.* **65**, 2344-2350, July 1994.
7. Z. Chen and A. Mandelis, "Scanning Photothermal Rate Window Spectrometry. Methodologies and Applications to the Thermal Diffusivity Measurement of Ultrahigh Thermal Conductors: CVD Diamonds", *Phys. Rev. B* **46**, 13526 - 13539, 15 November 1992 II.
6. **(Invited Review Paper)** A. Mandelis, "Photothermal Analysis of Thermal Properties of Solids", *J. Thermal Anal.* **37**, 1065 - 1101, 1991.
5. B. Peralta, S.C. Ellis, C. Christofides and A. Mandelis, "Photopyroelectric Measurement of the Thermal Diffusivity of Recrystallized High Purity Aluminum", *J. Res. Non Destructive Eval.* **3**, 69 - 80, April, 1991.
4. S.B. Peralta, Z.H. Chen and A. Mandelis, "Simultaneous Measurement of Thermal Diffusivity, Thermal Conductivity and Specific Heat by Impulse Response Photopyroelectric Spectrometry: Application to the Superconductor $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$ ", *Appl. Phys. A* **52**, 289 - 294, May, 1991.
3. S.B. Peralta, Z. Chen and A. Mandelis, "Photopyroelectric Measurement of the Thermal Diffusivity of $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$ and $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_x$ ", *Ferroelectrics* **118**, 425 - 433, 1991.
2. I.A. Vitkin, S.B. Peralta, A. Mandelis, W. Sadowski and E. Walker, "Photopyroelectric Impulse Response Measurements of Single Crystal $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$. A Temperature Study", *Meas. Sci. Technol.* **1**, 184 - 188, February, 1990.
1. A. Mandelis, F. Care, K.K. Chan and L.C.M. Miranda, "Photopyroelectric Detection of Phase Transitions in Solids", *Appl. Phys. A* **38** (2), 117 - 122, October, 1985.

II. Photovoltaic Solar Cell Diagnostic Techniques, Imaging and NDE

5. A. Mandelis, Y. Zhang and A. Melnikov, "Statistical theory and applications of lock-in carrierographic image pixel brightness dependence on multi-crystalline Si solar cell efficiency and photovoltage", *J. Appl. Phys.* (submitted March 2012)

4. A. Melnikov, B. Halliop, A. Mandelis and N. P. Kherani, "Optoelectronic transport property measurements of an amorphous silicon passivated c-silicon wafer using non-contacting methodologies", *Thin Solid Films* (In press; accepted March 2011).
3. A. Melnikov, P. Chen, Y. Zhang, and A. Mandelis, "Lock-in and heterodyne carrierographic imaging characterization of industrial multicrystalline silicon solar cells", *Int. J. Thermophys.* (Submitted February 2012).
2. A. Melnikov, A. Mandelis, J. Tolev, P. Chen and S. Huq, "Infrared lock-in carrierography (Photocarrier radiometric imaging) of Si solar cells, *J. Appl. Phys.* **107**, 114513 (1 – 11), 2010.
1. A. Mandelis, A. Melnikov, J. Tolev, J. Xia, S. Haq, and E. Lioudakis, "Non-destructive infrared optoelectronic lock-in carrierography of mc-Si solar cells, *Quant. Infra Red Thermogr. (QIRT) J.* **7** (1) 35 – 54 (2010).

III. Carrier-Density Diffusion-Waves in Semiconductors and Metrology using Carrier and Thermal Waves

61. J. Xia and A. Mandelis, "Direct Search Deep-Level Photo-Thermal Spectroscopy: An enhanced reliability method for overlapped semiconductor defect-state characterization", *Appl. Phys. Lett.* **96**, 262112 (1 – 3), (2010).
60. J. Xia and A. Mandelis, "Photocarrier radiometry study of radiative defect states in semi-insulating GaAs wafer", *Semicond. Sci. Technol.* **24**, 125002 (1 – 7), 2009.
59. J. Xia and A. Mandelis, "Broadening Effects and Ergodicity in Deep Level Photo-Thermal Spectroscopy of Defect States in Semi-Insulating GaAs: A Combined Temperature-, Pulse-Rate- and Time-Domain Study of Defect State Kinetics", *J. Appl. Phys.* **105**, 103712 (1 – 15), May 30, 2009.
58. C.-H. Wang, A. Mandelis, J. Tolev, B. Burchard and J. Meijer, "H⁺ ion-implantation energy dependence of electronic transport properties in the MeV range in *n*-type silicon wafers using frequency-domain photocarrier radiometry", *J. Appl. Phys.*, **101**, 123109 (1-11) (2007).
57. A. Mandelis and J. Xia, "Deep-Level Photo-Thermal Spectroscopy: Physical Principles and Applications to Semi-Insulating GaAs Band-gap Multiple Trap States", *J. Appl. Phys.* **103**, 043704 (1 – 17) (2008). *Paper selected for inclusion in Virtual Journal of Ultrafast Science* (<http://www.vjulfrafast.org>), **7** (3) 103, 043704 (1 - 17), March 1, 2008.
56. J. Xia and A. Mandelis, "Noncontact deep level photothermal spectroscopy: Technique and application to semi-insulating GaAs Wafers", *Appl. Phys. Lett.* **90**, 062119 (1-3) (2007)
55. D. Shaughnessy and A. Mandelis, "Electronic Defect and Contamination Monitoring in Si Wafers Using Spectrally Integrated Room-Temperature Photo-Carrier Radiometry", *J. Electrochem. Soc.* **153** (4) G283 – G290 (2006).
54. D. Shaughnessy, A. Mandelis, J. Batista, J. Tolev and B. Li, "Two-beam cross-modulation photocarrier radiometry. Principles and contrast amplification in semiconductor subsurface imaging", *Semicond. Sci. Technol.* 320-334 **21** (2006).
53. A. Mandelis, M. Pawlak, C. Wang, I. Delagadillo-Holfort and J. Pelzl, "Time-domain and lock-in rate-window photocarrier radiometric measurements of recombination processes in silicon", *J. Appl. Phys.* **98**, 123518: 1 - 13 (2005).
52. A. Mandelis and F. Rabago, "Ion implantation dose high-resolution monitoring in Si wafers using laser infrared photothermal radiometry with lock-in common-mode-rejection demodulation", *Solid-State Electron.* **49**, 769 – 773 (2005).
51. B. Li, D. Shaughnessy, and A. Mandelis, "Measurement accuracy analysis of photocarrier radiometric determination of electronic transport parameters of silicon wafers", *J. Appl. Phys.* **97**, 023701, 1-7 (2005)

50. A. Mandelis, "Photo-Carrier Radiometry of Semiconductors: A Novel Powerful Optoelectronic Diffusion-Wave Technique for Silicon Process Non-Destructive Evaluation", *NDT&E International* **39** (3), 244 – 252 (April 2006): *Invited paper selected among the 5 best papers* of the 3rd Int. Conf. On "Emerging Technologies in Non-Destructive Testing", Thessaloniki, Greece, May 26-28 (2003).
49. B. Li, D. Shaughnessy, A. Mandelis, J. Batista and J. Garcia, "Three-Layer Photo-Carrier Radiometry Model of Ion-Implanted Silicon Wafers", *J. Appl. Phys.* **95** (12), 7832 - 7840 (15 June 2004).
48. A. Mandelis, "Theory of Space Charge Layer Dynamics at Oxide-Semiconductor Interfaces under Optical Modulation and Detection by Laser Photocarrier Radiometry", *J. Appl. Phys.*, **97**, 083508-1 - 11 (April, 2005).
47. A. Mandelis, J. Batista, J. Gibkes, M. Pawlak and J. Pelzl, "Non-Contacting Laser Photocarrier Radiometric Depth Profilometry of Harmonically Modulated Band-Bending in the Space Charge Layer at Doped SiO₂ – Si Interfaces", *J. Appl. Phys.*, **97**, 083507-1 - 11 (April 2005).
46. B. Li, D. Shaughnessy, A. Mandelis, J. Batista and J. Garcia, "Accuracy of photo-carrier radiometric measurements of electronic transport properties of ion-implanted silicon wafers", *J. Appl. Phys.* **96** (1), 186 - 196 (1 July 2004).
45. A. Mandelis, M. Pawlak and D. Shaughnessy, "Carrier-Density-Wave Transport and Local Internal Electric Field Measurements in Biased Metal-Oxide-Semiconductor n-Si Devices using Contactless Laser Photo-Carrier Radiometry", *Semicond. Sci. Technol.* **19**, 1240 – 1249 (2004).
44. J. Batista, A. Mandelis, D. Shaughnessy and B. Li, "Deep subsurface electronic defect image contrast and resolution amplification in Si wafers using infrared photocarrier radiometry", *Appl. Phys. Lett.* **85** (10), 1713 - 1715 (6 Sept. 2004).
43. D. Shaughnessy, B. Li, A. Mandelis and J. Batista, "Ion Implant Dose Dependence of Photocarrier Radiometry at Multiple Excitation Wavelengths", *Appl. Phys. Lett.* **84** (25), 5219-5221 (June 2004).
42. J. Batista, A. Mandelis and D. Shaughnessy, "Temperature dependence of carrier mobility in FZ-Si wafers measured by infrared photo-carrier radiometry", *Appl. Phys. Lett.* **82**, 4077-4079 (9 June 2003).
41. A. Mandelis, J. Batista and D. Shaughnessy, "Infrared photo-carrier radiometry of semiconductors: Physical principles, quantitative depth profilometry and scanning imaging of deep sub-surface electronic defects", *Phys. Rev. B* **67**, 205208-1-18 (May 2003).
40. D. Shaughnessy and A. Mandelis, "Spectroscopic photothermal radiometry as a deep subsurface depth profilometric technique in semiconductors", *Rev. Sci. Instrum.* **74** (1), 529 – 532 (January 2003).
39. D. Shaughnessy and A. Mandelis, "Carrier-density-wave transport property depth profilometry using spectroscopic photothermal radiometry of silicon wafers II: Experimental and computational aspects", *J. Appl. Phys.* **93**, Number 9, 5244-5250 (1 May 2003).
38. D. Shaughnessy and A. Mandelis, "Carrier-density-wave transport property depth profilometry using spectroscopic photothermal radiometry of silicon wafers I: Theoretical aspects", *J. Appl. Phys.* **93**, Number 9, 5236-5243 (1 May 2003).
37. F. Rabago and A. Mandelis, "Common-mode-rejection demodulation lock-in technique for high-resolution characterization of ion implantation in silicon wafers", *Rev. Sci. Instrum.* **74** (1), 624 - 627 (January 2003).
36. M. E. Rodriguez, J. A. Garcia and A. Mandelis, "Infrared photothermal radiometry of deep subsurface defects in semiconductor materials", *Rev. Sci. Instrum.* **74** (1), 839 - 841 (January 2003).
35. A. Mandelis, M. E. Rodriguez, Y. Raskin and V. Gorodokin, "Laser Infrared Photothermal Radiometric and ELYMAT Characterization of p-Si Wafers Annealed in the Presence of an External Electric Field", *Phys. Stat. Sol. (a)* **185** (2), 471-478 (2001).
34. M. E. Rodriguez, A. Mandelis, G. Pan, J. A. Garcia and Y. Riopel, "Microelectronic Circuit Characterization via Photothermal Radiometry of Scribeline Recombination Lifetime", *Solid-State Electron.* **44**, 703-711 (2000).
33. A. Mandelis and Y. Riopel, "Laser infrared Photothermal Radiometry of Electronic Solids: Principles and Applications to Industrial Semiconductor Si Wafers", *J. Vac. Sci. Technol. A* **18** (2), 705-708, Mar/Apr 2000.

32. M. E. Rodriguez, A. Mandelis, G. Pan, J. A. Garcia, V. Gorodokin and Y. Raskin, "Minority Carrier Lifetime and Concentration Measurements on p-Si Wafers by Infrared Photothermal Radiometry and Microwave Photoconductance Decay", *J. Appl. Phys.* **87** (11) 8113 - 8121 (1 June 2000).
31. M. E. Rodriguez, A. Mandelis, G. Pan, L. Nicolaides, J. A. Garcia and Y. Riopel, "Computational Aspects of Laser Radiometric Multiparameter Fit for Carrier Transport Property Measurements in Si Wafers", *J. Electrochem. Soc.* **147** (2), 687-698 (2000).
30. **(Invited)** A. Mandelis and R. A. Budiman, "Evidence of Surface Acceptor State in Undoped Semi-Insulating GaAs by Photothermal Radiometric Deep Level Transient Spectroscopy", *Superficies Vacio* **8**, 13-17 (1999).
29. M. E. Rodriguez, J. A. Garcia, A. Mandelis, C. Jean and Y. Riopel, "Kinetics of Surface-State Laser Annealing in Si Frequency- Swept Infrared Photothermal Radiometry", *Appl. Phys. Lett.* **74**, Number 17, 2429-2431, 26 April 1999.
28. T. Ikari, A. Salnick and A. Mandelis, "Theoretical and Experimental Aspects of Three-Dimensional Infrared Photothermal Radiometry of Semiconductors", *J. Appl. Phys.* **85**, Number 10, 7392-7397, 15 May 1999.
27. A. Salnick, A. Mandelis and C. Jean, "Infrared Photothermal Radiometric Deep-Level Transient Spectroscopy of Shallow B+ Dopant States in p-Si", *Appl. Phys. Lett.* **71**, No. 18, 2671-2673, November 1997.
26. A. Salnick, A. Mandelis and C. Jean, "Detection of Silicon Wafer Contamination by Lifetime Measurement Using Infrared Photothermal Radiometry", *Phys. Stat. Solidi (a) Rapid Research Note* **163**, No. 1, R5-R6, September 1997.
25. A. Othonos, A. Salnick, A. Mandelis and C. Christofides, "Noncontact Carrier Lifetime Depth-Profiling of Ion-Implanted Si Using Photothermal Radiometry", *Phys. Stat. Solidi (a) Rapid Research Note* **161**, R13-R14, 1997.
24. A. Salnick, A. Mandelis, H. Ruda and C. Jean, "Relative Sensitivity of Photomodulated Reflectance and Photothermal Infrared Radiometry to Thermal and Carrier Plasma Waves in Semiconductors", *J. Appl. Phys.* **82**, No. 4, 1853-1859, August 1997.
23. A. Salnick, A. Mandelis, F. Funak and C. Jean, "Monitoring of ion Implantation in Si with Carrier Plasma Waves Using Infrared Photothermal Radiometry", *Appl. Phys. Lett.* **71**, No. 11, 1531-1533, September 1997.
22. A. Mandelis, M. Nestoros and C. Christofides, "Thermoelectronic-Wave Coupling in Laser Photothermal Theory of Semiconductors at Elevated Temperatures", *Opt. Eng.* **36** (2), 459-468, February 1997.
21. A. Salnick, C. Jean and A. Mandelis, "Noncontacting Photothermal Radiometry of SiO₂/Si MOS Capacitor Structures", *Solid State Electron* **41** (4), 591-597 (1997).
20. A. Mandelis and R.E. Wagner, "Quantitative Photo-Thermo-Modulated Optical Reflectance Studies of Crystalline and Ion-Implanted Germanium", *Jpn. J. Appl. Phys.* **35**, 1786-1797, March 1996.
19. A. Salnick, A. Mandelis and C. Jean, "Non-Contact Measurement of Transport Properties of Long Bulk-Lifetime Si Wafers using Photothermal Radiometry", *Appl. Phys. Lett.* **69** (17), 2522-2524, October 21, 1996.
18. A. Mandelis, A. Othonos, C. Christofides and J. Boussey-Said, "Non-Contacting Measurements of Photocarrier Lifetimes in Bulk- and Polycrystalline Thin-Film Si Photoconductive Devices by Photothermal Radiometry", *J. Appl. Phys.* **80** (9), 5332-5341, November 1, 1996.
17. A. Othonos, C. Christofides and A. Mandelis, "Photothermal Radiometric Investigation of Implanted Silicon: The Influence of Dose and Thermal Annealing", *Appl. Phys. Lett.* **69** (6), 821-823, August 5, 1996.
16. C. Christofides, F. Diakonos, A. Seas, C. Christou, M. Nestoros and A. Mandelis, "Two-Layer Model for Photomodulated Thermoreflectance of Semiconductor Wafers", *J. Appl. Phys.* **80**, 1715-1723, August 1, 1996.
15. A. Mandelis, R.A. Budiman, M. Vargas and D. Wolff, "Non-contact Photothermal Infrared Radiometric Deep-Level Transient Spectroscopy of GaAs Wafers", *Appl. Phys. Lett.* **67**, 1582-1584, September 11, 1995.

14. A. Mandelis, R. Bleiss and F. Shimura, "Highly Resolved Separation of Carrier and Thermal Wave Contributions to Photothermal Signals from Cr doped Silicon Using Rate Window Infrared Radiometry", *J. Appl. Phys.* **74**, 3431-3434, Sept. 1993.
13. Z.H. Chen and A. Mandelis, "Effects of Secondary Laser Illumination During the Transient Measurement in Optical and Electrical Deep Level Transient Spectroscopy (DLTS)", *Appl. Phys. Lett.* **59**, 2018 - 2021, 1991.
12. R. Wagner and A. Mandelis, "A Generalized Calculation of the Temperature and Drude Photo Modulated Optical Reflectance Coefficients in Semiconductors", *J. Phys. Chem. Solids* **52**, 1061 - 1070, 1991.
11. C. Christofides, A. Mandelis, K. Ghandi and R.E. Wagner, "Infrared Real time normalized Photopyroelectric Measurements of Crystalline Germanium: Instrumentation and Spectroscopy", *Rev. Sci. Instrum.* **61**, 2360 - 2367, September, 1990.
10. C. Christofides, I.A. Vitkin and A. Mandelis, "Photothermal Reflectance Investigation of Processed Silicon. I: Room Temperature Study of the Induced Damage and of the Annealing Kinetics of Defects in Ion Implanted Wafers", *J. Appl. Phys.* **67** (6), 2815 - 2821, March, 1990.
9. I.A. Vitkin, C. Christofides and A. Mandelis, "Photothermal Reflectance Investigation of Processed Silicon. II: Signal Generation and Lattice Temperature Dependence in Ion Implanted and Amorphous Thin Layers", *J. Appl. Phys.* **67** (6), 2822 - 2830, March, 1990.
8. I.A. Vitkin, C. Christofides and A. Mandelis, "Laser Induced Photothermal Reflectance Investigation of Silicon Damaged by Arsenic Ion Implantation: A Temperature Study", *Appl. Phys. Lett.* **54** (24), 2392 - 2394, June, 1989.
7. A. Mandelis, "Coupled AC Photocurrent and Photothermal Reflectance Response Theory of Semiconducting p n Junctions. I", *J. Appl. Phys.* **66** (11), 5572 - 5583, December, 1989.
6. A. Mandelis, A.A. Ward and K.T. Lee, "Combined AC Photocurrent and Photothermal Reflectance Measurements in Semiconducting p n Junctions. II.", *J. Appl. Phys.* **66** (11), 5584 - 5593, December, 1989.
5. J. Zuccon and A. Mandelis, "High Frequency Differential Piezoelectric Photoacoustic Investigation of Ion Implanted (100) Silicon Wafers via Laser Beam Position Modulation", *IEEE Trans. Ultrasonics, Ferroelectrics, and Frequency Control*, **UFFC 35**, 5 - 13, January, 1988.
4. A. Mandelis, W. Lo and R. Wagner, "Photopyroelectric Spectroscopy (P2ES) of Electronic Defect Centers in Crystalline n CdS", *Appl. Phys.* **A44**, 123 - 130, October, 1987.
3. A. Mandelis, A. Williams and E.K.M. Siu, "Photothermal Wave Imaging of MOS Field Effect Transistor (MOSFET) Structures", *J. Appl. Phys.* **63**, (1), 92 - 98, January, 1988.
2. T. Dioszeghy and A. Mandelis, "Studies of Defect Structure Effects on the Transport Properties of Pure Crystalline n CdS via the Temperature Dependence of Photoacoustic and Photocurrent Spectra", *Int. J. Phys. Chem. Solids* **47**, 1115 - 1128, December, 1986.
1. A. Mandelis, "A Variational Green's Function Approach to Theoretical Treatment and Applications of the Capacitance of Three Dimensional Geometries", *Can. J. Phys.* **60**, 179 - 195, February, 1982.

IV. Photothermal Depth Profilometry, Imaging and Inverse Problems

40. J. Zhang , G-X. Xie, C-H. Wang, and A. Mandelis, "Modeling of thermal-wave fields in radially inhomogeneous spherical solids using the Green function method", *Int. J. Thermophys.* (Submitted February 2012)
39. C-H. Wang, J. Zhang, L.W. Liu, and A. Mandelis, "Equivalence of normalized thermal-wave fields between curved and flat surfaces and its application in the characterization of curved samples", *Int. J. Thermophys.* (Submitted February 2012)

38. N. Tabatabaei and A. Mandelis, "Thermal Coherence Tomography: Depth-resolved imaging in parabolic diffusion-wave fields using the thermal-wave radar", *Int. J. Thermophys.* (Submitted February 2012)
37. G. Xie, J. Zhang, L. Liu, C-H. Wang and A. Mandelis, "Thermal conductivity depth-profile reconstruction of multilayered cylindrical solids using the Green function method", *J. Appl. Phys.* **109**, 113534 (1 - 13) (June 2011)
36. P. Martinez, A. Mandelis and J. J. Alvarado-Gil, "Optical and thermal depth profile reconstructions of inhomogeneous polymerization in dental resins using photothermal waves", *J. Appl. Phys.* **108**, 054902 (1 - 10), (2010).
35. L. Liu, C. Wang, X. Yuan and A. Mandelis, "Curvature-insensitive methodology for thermal-wave depth-profilometry in curvilinear solids", *J. Phys. D: Appl. Phys.* **43**, 285403 (1 - 9) (2010).
34. R. Cellorio, E. Apiñaniz, A. Mendioroz, A. Salazar and A. Mandelis, "Accurate reconstruction of the thermal conductivity depth profile in case hardened steel", *J. Appl. Phys.* **107**, 083519 (1 - 7) May 2010
33. L. Liu, C. Wang, X. Yuan and A. Mandelis, "Similarity normalization method for thermal conductivity depth profile reconstruction from inhomogeneous cylindrical and flat solids using thermal waves", *J. Appl. Phys.* **107**, 053503 (1 - 5), March 2010.
32. P. Martínez-Torres, A. Mandelis and J. J. Alvarado-Gil, "Photothermal determination of thermal diffusivity and polymerization depth profiles of polymerized dental resins", *J. Appl. Phys.* **106**, 114906 (1 - 7), December 2009.
31. H. Qu, C-H. Wang, X. Guo and A. Mandelis, "Reconstruction of depth profiles of thermal conductivity of case hardened steels using a three-dimensional photothermal technique", *J. Appl. Phys.* **104**, 113518 (1 - 9), December 2008.
30. R. Celorio, A. Mendioroz, E. Apiñaniz, A. Salazar, C. Wang and A. Mandelis, "Reconstruction of radial thermal conductivity depth profile in case hardened steel rods", *J. Appl. Phys.* **105**, 083517 (1 - 7), April 2009.
29. X. Guo, K. Sivagurunathan, J. Garcia, A. Mandelis, S. Giunta, and S. Milletari, "Laser photothermal radiometric instrumentation for fast in-line measurements of industrial steel hardness inspection and quality control", *Appl. Opt.* **48** No. 7, C11 - C23, 1 March 2009.
28. C. Wang, A. Mandelis, H. Qu and Z.-Y. Chen, "Influence of laser beam size on measurement sensitivity of thermophysical property gradients in layered structures using thermal-wave techniques", *J. Appl. Phys.* **103**, 043510 (1 - 8) (2008).
27. C.H. Wang and A. Mandelis, "Case depth determination in heat treated steel products using photothermal radiometric interferometric phase minima", *NDT&E* **40**, 158 - 167 (2007).
26. Y. Liu, A. Mandelis, N. Baddour and C.H. Wang, "Transverse hardness photothermal phase imaging and depth profilometry of heat treated steels", *Canadian Institute for NDE (CINDE) Journal*, **28** (1), 14 - 22 (January/February 2007).
25. Y. Liu, N. Baddour, A. Mandelis and C. Beingessner, "Photothermal Depth Profilometry of Heat-Treated Hardened 0.15 - 0.2 % C, 0.6 - 0.9 % Mn Steels", *J. Appl. Phys.* **96** (3), 1521 - 1528 (1 August 2004).
24. Y. Liu, N. Baddour, A. Mandelis and C. Wang, "Inspection of an End Quenched 0.15-0.2% C, 0.6-0.9% Mn Steel Jominy Bar with Photothermal Radiometric Techniques", *J. Appl. Phys.* **96** (4), 1929 - 1933 (15 August 2004).
23. Y. Liu, N. Baddour and A. Mandelis, "Transverse depth-profilometric hardness photothermal phase imaging of heat treated steels", *J. Appl. Phys.* **94** (9), 5543-5548 (1 November, 2003)
22. L. Nicolaidis and A. Mandelis, "Methods for Surface Roughness Elimination from Thermal-Wave Frequency Scans in Thermally Inhomogeneous Solids", *J. Appl. Phys.* **90** (3), 1255-1265 (1 August 2001).

21. L. Nicolaides and A. Mandelis, "Experimental and Image-Inversion Optimization Aspects of Thermal-Wave Diffraction Tomographic Microscopy", *Optics Express* **7** (13), 519 - 532 (2000).
20. E. L. Miller, I. Yavuz, L. Nicolaides and A. Mandelis, "An Adaptive, Multiscale Inverse Scattering Approach to Photothermal Depth Profilometry", *Circuits Systems Signal Process* **19** (4), 339 - 363 (2000).
19. L. Nicolaides, A. Mandelis and C. J. Beingsner, "Physical Mechanisms of Thermal Diffusivity Depth-Profile Generation in Hardened low-alloy Mn, Si, Cr, Mo Steel Reconstructed by Photothermal Radiometry", *J. Appl. Phys.* **89** (12), 7879-7884 (15 June 2001).
18. A. Mandelis, M. Munidasa and L. Nicolaides, "Laser Infrared Photothermal Radiometric Depth Profilometry of Steels and its Potential in Rail track Evaluation", *NDT&E International* **32**, 437-443 (1999).
17. M. Munidasa, F. Funak and A. Mandelis, "Application of a Generalized Methodology for Quantitative Thermal Diffusivity Depth Profile Reconstruction in Manufactured Inhomogeneous Steel-Based Materials", *J. Appl. Phys.* **83**, No. 7, 3495-3498, April 1998.
16. M. Munidasa, A. Mandelis and M. Ball, "Buried Thermoplastic Layer Diagnostics by the Use of Combined Frequency-Domain and Impulse Response Photo-Thermo-Mechanical Radiometry", *Rev. Sci. Instrum.* **69**, No. 2, 507-511, February 1998.
15. L. Nicolaides, M. Munidasa and A. Mandelis, "Thermal-wave Infrared Radiometric Slice Diffraction Tomography with Back-propagation and Transmission Reconstructions: Experimental", *Inverse Problems* **13**, 1413-1425 (1997).
14. L. Nicolaides and A. Mandelis, "Image-enhanced Thermal-wave Slice Diffraction Tomography with Numerically Simulated Reconstruction", *Inverse Problems* **13**, 1393-1412 (1997).
13. A. Mandelis, F. Funak and M. Munidasa, "Generalized Methodology for Thermal Diffusivity Depth Profile Reconstruction in Semi-Infinite and Finitely Thick Inhomogeneous Solids", *J. Appl. Phys.* **80**, 5570-5578, November 15, 1996.
12. **(Invited)** A. Mandelis and M. Munidasa, "Depth Profilometry of Near-Surface Inhomogeneities via Laser-Photothermal Probing of the Thermal Diffusivity of Condensed Phases", *Int. J. Thermophys.* **15**, 1299-1309, November 1994.
11. O. Padé and A. Mandelis, "Computational Thermal Wave Slice Tomography with Back Propagation and Transmission Reconstructions", *Rev. Sci Instrum.* **64**, 3548-3562, December 1993.
10. O. Padé and A. Mandelis, "Thermal Wave Slice Tomography Using Wave Field Reconstruction", *Inverse Problems* **10**, 185-197, (1994).
9. M. Munidasa, T. C. Ma, A. Mandelis, S.K. Brown and L. Mannik, "Non Destructive Depth Profiling of Laser Processed Zr 2.5Nb Alloy by Infrared Photothermal Radiometry", *J. Mat. Sci. Eng. A* **159**, 111 - 118, December 1992.
8. T. C. Ma, M. Munidasa and A. Mandelis, "Photoacoustic Frequency Domain Depth Profilometry of Surface Layer Inhomogeneities: Application to Laser Processed Steels", *J. Appl. Phys.* **71**, 6029 - 6035, 1992.
7. M. Munidasa, A. Mandelis and C. Ferguson, "Resolution of Photothermal Tomographic Imaging of Subsurface Defects in Metals with Ray Optic Reconstruction", *Appl. Phys. A.* **54**, 244 - 250, 1992.
6. A. Mandelis, E. Schoubs, S.B. Peralta and J. Thoen, "Photoacoustic Depth Profilometry of Magnetic Field induced Thermal Diffusivity Inhomogeneity in the Liquid Crystal Octylcyanobiphenyl (8CB)", *J. Appl. Phys.* **70**, 1771 - 1777, August, 1991.
5. A. Mandelis, S.B. Peralta and J. Thoen, "Photoacoustic Frequency Domain Depth Profiling of Continuously Inhomogeneous Condensed Phases. Theory and Simulations for the Inverse Problem", *J. Appl. Phys.* **70**, 1761 - 1770, August, 1991.

4. M. Munidasa and A. Mandelis, "Photopyroelectric Thermal Wave Tomography of Aluminum with Ray Optic Reconstruction", J.O.S.A. **A8**, 1851 - 1858, December, 1991.
3. A. Mandelis, E. Schoubs, S. B. Peralta and J. Thoen, "Photoacoustic Frequency-Domain Depth Profiling of Continuously Inhomogeneous Solids; Theory and Quantitative Profilometry of Octylcyanobiphenyl (8CB) Liquid Crystals", J. Acoust. Soc. Am. **89**, 1909-1910 (1991).
2. M. Mieszkowski and A. Mandelis, "Photopyroelectric Spatially Resolved Imaging of Thermal Wave Fields", J.O.S.A. A **7** (4), 552 - 557, April, 1990.
1. A. Mandelis and J.D. Lymer, "Quantitative Depth Profiling of Biporous Nickel Electrodes by Frequency Domain Laser Induced Photoacoustic Spectroscopy", Appl. Spectrosc. **39** (3), 473 - 480, May/June, 1985.

V. Diffusion-Wave Instrumentation, Measurement and Analytical Methodologies for NDE and Imaging

44. N. Tabatabaei and A. Mandelis, "Thermal coherence tomography using match filter binary phase coded diffusion waves", Phys. Rev. Lett. **107**, 165901 (14 October 2011) [5 pages]. *Article highlighted by the Journal as being of special interest.*
43. S. Kaipilavil and A. Mandelis, "Highly depth-resolved chirp pulse photothermal radar for bone diagnostics", Rev. Sci. Instrum. **82**, 074906 (1 – 9) (2011). *Paper selected for inclusion in Virtual Journal of Biological Physics Research (VJBIO) <http://www.vjbio.org>, 22 (3), August 1, 2011. Section: Instrumentation Development. Paper selected for inclusion in Virtual Journal of Ultrafast Science <http://www.vjulfrafast.org>, 10 (8), August 2011. Section: Applications*
42. R. Velasquez-Hernandez, A. Melnikov, A. Mandelis, K. Sivagurunathan, M. E. Rodriguez-Garcia and J. Garcia, "Non-destructive measurements of large case depths in hardened steels using the thermal-wave radar", NDT&E International **45**, 16 – 21 (2012).
41. N. Tabatabaei, A. Mandelis and B. Amaechi, "Thermophotonic radar imaging; An emissivity-normalized modality with advantages over phase lock-in thermography", Appl. Phys. Lett. **98**, 163706 (1 – 3) (2011).
40. J. Tolev and A. Mandelis, "Laser photothermal non-destructive inspection method for hairline crack detection in unsintered automotive parts: A statistical approach", NDT&E Int. **43** (4), 283 – 296 (June 2010).
39. N. Tabatabaei and A. Mandelis, "Thermal-wave radar: A novel subsurface imaging modality with extended depth-resolution dynamic range", Rev. Sci. Instrum. **80**, 034902 (1 – 11) (March 2009).
38. F. Li, H. Zhan, M. A. Winnik, A. Matvienko, and A. Mandelis, "Polypyrrole particles as a thermal transducer of NIR radiation in hot-melt adhesives", J. Mat. Chem. **40**, 4309-4315 (2007).
37. C.-H. Wang, Y. Liu, A. Mandelis and J. Shen, "Frequency Domain Photothermal Radiometry with Spherical Solids", J. Appl. Phys. **101**, 083503 (1 – 8) (2007).
36. C. Wang and A. Mandelis, "Characterization of hardened cylindrical C1018 steel rods (0.14–0.2% C, 0.6–0.9% Mn) using photothermal radiometry", Rev. Sci. Instrum. **78**, 054902 (1 – 5) (2007).
35. B. Li, D. Shaughnessy and A. Mandelis, "Influence of vignetting on signal analysis of photocarrier radiometry of semiconductor wafers", Rev. Sci. Instrum. **76**, 063703 (1 – 6) (2005).

34. Y. Liu, A. Mandelis, M. Choy, C. Wang and L. Segal, "Remote Quantitative Temperature and Thickness Measurements of Plasma-deposited Titanium Nitride Thin Coatings on Steel using a Laser Interferometric Thermoreflectance Optical Thermometer", *Rev. Sci. Instrum.* **76**, 084902 (1 - 11), (August 2005).
33. C. Wang, A. Mandelis, and Y. Liu, "Thermal-wave nondestructive evaluation of cylindrical composite structures using frequency-domain photothermal radiometry", *J. Appl. Phys.* **97**, 014911 (1 - 12) (2005)
32. C. Wang, A. Mandelis and Y. Liu, "Photothermal Radiometry with Solid Cylindrical Samples", *J. Appl. Phys.* **96**, 3756 - 3762 (2004).
31. M. Terazima, A. Mandelis, et al. "Quantities, Terminology, and Symbols in Photothermal and Related Spectroscopies; (IUPAC Recommendations 2004)", *IUPAC Pure Appl. Chem.* **76**, 1083 - 1118 (2004)
30. B. Li, A. Mandelis and Z. Z. Kish, "Photothermal investigation of the thermal shock behavior of alumina ceramics for engine components", *J. Appl. Phys.* **95** (3), 1042-1049 (1 February 2004).
29. J. A. Balderas-Lopez and A. Mandelis, "Novel Transmission Open Photoacoustic Cell Configuration for Thermal Diffusivity Measurements in Liquids", *Int. J. Thermophys.* **23**, No. 3, 605 - 614 (May 2002).
28. M. E. Rodriguez, P. J. Mendoza, A. Mandelis and L. Nicolaidis, "Combined photothermal and photoacoustic characterization of silicon-epoxy composites and the existence of a particle thermal percolation threshold", *Nuclear Instrum. Methods Phys. Res. B* **184**, 421-429 (2001).
27. J. A. Balderas and A. Mandelis, "Simple, Accurate and Precise Measurements of Thermal Diffusivity in Liquids using a Thermal-Wave Cavity", *Rev. Sci. Instrum.* **72** (6), 2649-2652 (June 2001).
26. A. Mandelis, "Diffusion-Wave Laser Radiometric Diagnostic Quality Control Technologies for Materials NDE/NDT", *NDT&E Int.* **34**, 277-287 (2001); Invited paper selected in competition for publication in a special issue of *NDT&E International*.
25. A. Mandelis, S. Paoloni and L. Nicolaidis, "Lock-in Common Mode Rejection Demodulation: Measurement Technique and Applications to Thermal-Wave Detection. Theoretical", *Rev. Sci. Instrum.* **71** (8), 2440-2444 (June 2000).
24. S. Paoloni, L. Nicolaidis and A. Mandelis, "Lock-in Common Mode Rejection Demodulation: Measurement Technique and Applications to Thermal-Wave Detection. Experimental", *Rev. Sci. Instrum.* **71** (8), 2445-2451 (June 2000).
23. C.-H. Wang and A. Mandelis, "Instrumental Noise and Detectivity Analysis of Photopyroelectric Destructive Thermal-Wave Interferometry", *Rev. Sci. Instrum.* **71** (5), 1961-1970 (May 2000).
22. A. Mandelis and C. Wang, "A Novel PVDF Thin-Film Photopyroelectric Thermal-Wave Interferometry", *Ferroelectrics* **236**, 235- 246 (2000).
21. **(Invited Review Paper)** A. Mandelis, "Laser Infrared Photothermal Radiometry of Semiconductors: Principles and Applications to Solid-State Electronics", *Solid-State Electron.* **42**, No. 1, 1-15, 1998.
20. J. Shen, A. Mandelis and B.D. Aloysius, "Thermal-Wave Resonant-Cavity Measurements of the Thermal Diffusivity of Air: A comparison between Cavity-Length and Modulation-Frequency Scans", *Int. J. Thermophys.* **17**, No. 6, 1241-1254, November 1996.
19. J. Shen and A. Mandelis, "Thermal-Wave Resonator Cavity", *Rev. Sci. Instrum.* **66**, 4999-5005, October 1995.
18. **(Invited Review Paper):** A. Mandelis, "Signal-to-Noise Ratios in Lock-in Amplifier Synchronous Detection: A Generalized Communications Systems Approach with Application to Frequency-, Time-, and Hybrid (Rate-Window) Photothermal Measurements", *Rev. Sci. Instrum.* **65**, 3309-3323, November 1994.
17. **(Invited Review Paper)** A. Mandelis, "Photopyroelectric Spectroscopy of Condensed Phases: Technique and the State of the Art", *Condensed Matter News* **2**, 3-11, May/June 1993.

15. Z.H. Chen, R. Bleiss, A. Mandelis and F. Shimura, "Photothermal Rate Window Spectrometry for Non Contact Bulk Lifetime Measurements in Semiconductors", J. Appl. Phys. **73**, 5043-5048, May 1993.
15. A. Mandelis and Z. Chen, "Lock in Rate Window Thermomodulation (Thermal Wave) and Photomodulation Spectrometry: Technique, Instrumentation and Measurement Methodologies", Rev. Sci. Instrum. **63**, 2977 - 2988, May 1992.
14. C. Christofides, K. Ghandi and A. Mandelis, "Optimization and Characterization of a Differential Photopyroelectric Spectrometer", Meas. Sci. Technol. **1**, 1363 - 1370 (1990). (*Paper selected for inclusion in Engineering Optics, February, 1991 issue*)
13. **(Invited Review Paper)** H. Coufal and A. Mandelis, "Photopyroelectric Sensors for the Photothermal Analysis of Condensed Phases", Ferroelectrics **118**, 379 409, 1991.
12. S.B. Peralta, K. Ghandi and A. Mandelis, "Optical Power Monitor Using a Thin-Film Pyroelectric Bimorph", Rev. Sci. Instrum. **61**, 1038-1043, March 1990.
11. A. Mandelis, F. Boroumand, H. Solka, J. Highfield and H. van den Bergh, "Fourier Transform Infrared Photopyroelectric Spectroscopy of Solids; A New Technique", Appl. Spectrosc. **44** (1), 132 - 143, January, 1990.
10. M. Mieszkowski, K.F. Leung and A. Mandelis, "Photopyroelectric (P2E) Thermal Wave Detection Via Contactless Capacitive PVDF Metal Probe Tip Coupling", Rev. Sci. Instrum. **60** (3), 306 316, March, 1989.
9. A. Mandelis and J.F. Power, "Frequency Modulated Impulse Response Photothermal Detection Through Optical Reflectance I: Theory", Appl. Opt. **27** (16), 3397 - 3407, August, 1988.
8. J.F. Power and A. Mandelis, "Frequency Modulated Impulse Response Photothermal Detection Through Optical Reflectance II: Experimental", Appl. Opt. **27** (16), 3408 - 3417, August, 1988.
7. A. Mandelis, "Time Delay Domain and Pseudo Random Noise Photoacoustic and Photothermal Wave Spectroscopies. A Review of the State of the Art", IEEE Transactions on Sonics and Ultrasonics, Special Issue on Photoacoustics **UFFC 33**, 590 614, September, 1986.
6. A. Mandelis, "Frequency Modulated (FM) Time Delay Photoacoustic and Photothermal Wave Spectroscopies. Technique, Instrumentation and Detection. Part I: Theoretical", Rev. Sci. Instr. **57** (4), 617 - 621, April, 1986.
5. A. Mandelis, L.M.L. Borm and J. Tiessinga, "Frequency Modulated (FM) Time Delay Photoacoustic and Photothermal Wave Spectroscopies. Technique, Instrumentation and Detection. Part II: Mirage Effect Spectrometer Design and Performance", Rev. Sci. Instr. **57** (4), 622 - 629, April, 1986.
4. A. Mandelis, L.M.L. Borm and J. Tiessinga, "Frequency Modulated (FM) Time Delay Photoacoustic and Photothermal Wave Spectroscopies. Technique, Instrumentation and Detection. Part III: Mirage Effect Spectrometer, Dynamic Range and Comparison to Pseudo Random Binary Sequence (PRBS) Method", Rev. Sci. Instr. **57** (4), 630 - 635, April, 1986.
3. A. Mandelis, "Frequency Domain Photopyroelectric Spectroscopy of Condensed Phases: A New, Simple and Powerful Spectroscopic Technique", Chem. Phys. Lett. **108** (4), 388 - 392, July, 1984.
2. A. Mandelis, Y.C. Teng and B.S.H. Royce, "Phase Measurements in the Frequency Domain Photoacoustic Spectroscopy of Solids", J. Appl. Phys. **50** (11), 7138 - 7148, November, 1979.
1. A. Mandelis and B.S.H. Royce, "Time Domain Photoacoustic Spectroscopy of Solids", J. Appl. Phys. **50** (6), 4330 - 4338, June, 1979.

VI. Biothermophotonics and Biomedical Photoacoustics of Hard and Soft Tissues

39. R. Alwi, S. Telenkov, A. Mandelis, T. Leshuk, F. Gu and Kirk Michaelian, "Silica-coated super paramagnetic iron oxide nanoparticles (SPION) as biocompatible contrast agents in biomedical photoacoustics", *Biomed. Opt. Express* (submitted March 2012).
38. S. Telenkov, R. Alwi, and A. Mandelis, "Signal-to-noise optimization of correlation photoacoustic (radar) imaging through optical modulation "waveform engineering"", *IEEE Trans. Ultrasonics, Ferroelectrics, Frequency Control* (TUFFC-05061-2012) (submitted March 2012)
37. R. Alwi, S. Telenkov, A. Mandelis, and F. Gu, "Study of Tissue Phantoms, Tissues, Contrast Agent with the Biophotoacoustic Radar and Comparison to Ultrasound Imaging for Deep Subsurface Imaging", *Int. J. Thermophys.* (submitted February, 2012)
36. X. Guo, A. Mandelis, and B. Zinman, "Non-invasive Glucose Measurements using Wavelength Modulated Differential Photothermal Radiometry (WM-DPTR)", *Int. J. Thermophys.* (submitted February, 2012)
35. J. Kim, A. Mandelis, A. Matvienko, S. Abrams, and B. T. Amaechi, Detection of Dental Secondary Caries Using Frequency-Domain Infrared Photothermal Radiometry (PTR) and Modulated Luminescence (LUM), *Int. J. Thermophys.* (submitted February, 2012)
34. B. Lashkari and A. Mandelis, "Comparison Between Pulsed and Frequency-domain (Photoacoustic Radar) Modalities: Signal-to-Noise Ratio, Contrast, Resolution, and Maximum Depth Detectivity", *Int. J. Thermophys.* (submitted February, 2012)
33. K. Sreekumar and A. Mandelis, "Ultra-deep Bone Diagnostics with Fat-Skin overlayers Using New Pulsed Photothermal Radar", *Int. J. Thermophys.* (submitted February, 2012)
32. N. Tabatabaei, A. Mandelis, M. Dehghany, K. H. Michaelian and B. T. Amaechi, "On the sensitivity of thermophotonic lock-in imaging and polarized Raman spectroscopy to early dental caries diagnosis", *J. Biomed. Opt.* **17** (2), 025002 (4 pages) (February 2012).
31. D. Fried, A. Mandelis and M. Morris, "Special Section Guest Editorial: Hard Tissue Optics and Related Methods", *J. Biomed. Opt.* **16** (7), 071401 (July 2011). doi:10.1117/1.3612191.
30. B. Lashkari and A. Mandelis, "Comparison between pulsed laser and frequency-domain photoacoustic modalities: Signal-to-noise ratio, contrast, resolution and maximum depth detectivity", *Rev. Sci. Instrum.* **82**, 094903 (1 – 14) (2011). *Paper selected for inclusion in Virtual Journal of Biological Physics Research (VJBIO)* <http://www.vjbio.org>, **22** (2), September 15, 2011. Section: Instrumentation Development. *Paper selected for inclusion in Virtual Journal of Ultrafast Science (VJUFS)* <http://www.vjulfrafast.org> **10** (10), October 2011. Section: Ultrafast Methods and Measurement Techniques.
29. A. Mandelis and X. Guo, "Wavelength modulated differential photothermal radiometry: theory and experimental applications to glucose detection in water", *Phys. Rev. E* **84**, 041917 (1 – 14) (2011). DOI: 10.1103/PhysRevE.84.041917
28. S. Telenkov, R. Alwi, A. Mandelis and A. Worthington, "Frequency-domain photoacoustic phased array probe for biomedical imaging applications", *Opt. Lett.* **36** (23) 4560-2 (Dec. 1, 2011) DOI: 10.1364/OL.36.004560. *Paper selected for inclusion in Virtual Journal for Biomedical Optics (VJBO)* http://www.opticsinfobase.org/vjbo/virtual_issue.cfm **2** (2), Feb.1, 2012. Section: Photoacoustic Imaging.
27. B. Lashkari and A. Mandelis, "Linear frequency modulation photoacoustic radar: Optimal bandwidth and signal-to-noise ratio for frequency-domain imaging of turbid media", *J. Acoust. Soc. Am.* **130** (3) 1313 – 1324 (Sept. 2011).

26. A. Hellen, A. Mandelis, Y. Finer and B. T. Amaechi, "Quantitative evaluation of the remineralization of artificially demineralized human enamel using photothermal radiometry and modulated luminescence", *J. Biophotonics* **4**, No. 11–12, 788–804 (2011) / DOI 10.1002/jbio.201100026.
25. S. Telenkov and A. Mandelis, "Signal-to-noise analysis of biomedical photoacoustic measurements in time- and frequency-domains", *Rev. Sci. Instrum.* **81**, 124901 (1 – 7) (2010).
24. A. Hellen, A. Mandelis, Y. Finer and B. T. Amaechi, "Quantitative evaluation of the kinetics of human enamel simulated caries using photothermal radiometry and modulated luminescence", *J. Biomed. Opt.* **16** (7), 071406 (1- 13), (July 2011). doi:10.1117/1.3564909. *Paper selected for inclusion in Virtual Journal of Biological Physics Research (VJBIO)* <http://www.vjbio.org>, **22** (2), July 15, 2011. Section: Instrumentation Development.
23. A. Hellen, A. Matvienko, A. Mandelis, Y. Finer and B. T. Amaechi, "Optothermophysical properties of demineralized human dental enamel determined using photothermally generated diffuse photon density and thermal wave fields", *Appl. Opt.* **49** (36), 6938 – 6951 (20 Dec. 2010).
22. N. Tabatabaei, A. Mandelis and B. T. Amaechi, "Thermophotonic lock-in imaging of early demineralized and carious lesions in human teeth", *J. Biomed. Opt.* **16** (7), 071402 (1 – 10) (July 2011). doi:10.1117/1.3564890. *Paper selected for inclusion in Virtual Journal of Biological Physics Research (VJBIO)* <http://www.vjbio.org>, **22** (2), July 15, 2011. Section: Instrumentation Development.
21. B. Lashkari and A. Mandelis, "Photoacoustic Radar imaging signal-to-noise ratio, contrast and resolution enhancement using nonlinear chirp modulation", *Opt. Lett.* **35**, 1623 - 1625 (2010).
20. A. Mandelis, C.-H. Kwan and A. Matvienko, "Dynamic photophysical processes in laser irradiated human cortical skull bone measured by means of modulated luminescence", *Phys. Rev. E* **80**, 021920 (14 pages) (August 2009). *Paper selected for inclusion in Virtual Journal of Biological Physics Research (VJBIO)* <http://www.vjbio.org>, **18** (5), Sept. 1, 2009. Section: Physical Studies of Cell Mechanics.
19. S. Telenkov and A. Mandelis, "Photothermoacoustic imaging of biological tissues: maximum depth characterization comparison of time- and frequency-domain measurements", *J. Biomed. Opt.* **14** (4), 4-044025 (12 pages) (July/August 2009).
18. A. Mandelis, G. J. Diebold, T. Kitamori, A. Hibara and I. A. Vitkin, "Preface to Special Topic: Applied Biophysics", *J. Appl. Phys.* **105**, 101901 (2 pages), May 15, 2009).
17. A. Matvienko, A. Mandelis and S. Abrams, " Robust multi-parameter evaluation method of optical and thermal properties of a layered tissue structure using photothermal radiometry", *Appl. Opt.* **48** (17), 3193 – 3204 (June 2009). *Paper selected for inclusion in Virtual Journal for Biomedical Optics (VJBO)* (http://vjbo.osa.org/virtual_issue.cfm), **4** (8), July 30, 2009. Section: Dentistry.
16. **(Invited)** S. Telenkov, A. Mandelis, B. Lashkari and M. Forcht, "Frequency-domain photothermoacoustics: alternative imaging modality of biological tissues", Special Issue on Applied Biophysics; *J. Appl. Phys.* **105**, 102029 (8 pages) (May 15, 2009). *Paper selected for inclusion in Virtual Journal of Biological Physics Research* (www.vjbio.org), **17** (11), June 1, 2009. Section: Instrumentation Development.
15. **(Invited)** A. Matvienko, A. Mandelis, R.J. Jeon, and S. H. Abrams, "Theoretical analysis of coupled diffuse-photon-density and thermal-wave field depth profiles photothermally generated in layered turbid dental structures." Special Issue on Applied Biophysics; *J. Appl. Phys.* **105**, 102022 (15 pages) (May 15, 2009). *Paper selected for inclusion in Virtual Journal of Biological Physics Research* (www.vjbio.org), **17** (11), June 1, 2009. Section: Multicellular Phenomena.

14. R. J. Jeon, A. Hellen, A. Matvienko, A. Mandelis, S. H. Abrams and B. T. Amaechi, "In Vitro Detection of Enamel and Root caries Using Photothermal Radiometry and Modulated Luminescence", *J. Biomed. Opt.* **13** (3) 034025 (11 pages) (May/June 2008)
13. R. J. Jeon, A. Matvienko, A. Mandelis, S. H. Abrams, B. T. Amaechi and G. Kulkarni, "Detection of Interproximal Demineralized Lesions on Human Teeth *in vitro* Using Frequency-Domain Infrared Photothermal Radiometry and Modulated Luminescence", *J. Biomed. Opt.* **12** (3), 034028 (1-13) (May/June 2007). *Selected for the Virtual Journal of Biological Physics Research*: (<http://www.vjbio.org/>) , **12**, 034028 (1-13) (July 2007).
12. S. A. Telenkov and A. Mandelis, "Fourier-Domain Biophotoacoustic Sub-surface Depth Selective Amplitude and Phase Imaging of Turbid Phantoms and Biological Tissue", *J. Biomed. Opt.* **11** (4), 044006 (10 pages) (July/Aug. 2006).
11. G. M. Spirou, A. Mandelis, I. A. Vitkin and W. M. Whelan, "Frequency-domain photothermoacoustic signal amplitude dependence on the optical properties of water: turbid polyvinyl chloride-plastisol system", *Appl. Opt.* **47** (No. 4) 2564 – 2573 (10 May 2008). *Paper selected for inclusion in Virtual Journal of Biomedical Optics* (http://vjbo.osa.org/virtual_issue.cfm), **3** (6), June 17, 2008.
10. **(Invited)** A. Mandelis "Bioacoustophotonic Depth-Selective Imaging of Turbid Media and Tissues: Instrumentation and Measurements", *Physics in Canada, Special Issue on Instrumentation and Measurement Physics*, Vol. **62** (2), 83 - 90 (March/April 2006).
9. Y. Fan, A. Mandelis, G. Spirou, I. A. Vitkin and W. M. Whelan, "Laser photothermoacoustic heterodyned lock-in depth profilometry in turbid tissue phantoms", *Phys. Rev. E* **72**, 051908 (1- 11) (2005). *Paper selected for inclusion in Virtual Journal of Biological Physics Research* (www.vjbio.org) , 10 (10) November 15, 2005.
8. A. Mandelis, N. Baddour, Y. Cai and R. G. Walmsley, "Laser-Induced Photo-thermo-acoustic Pressure-Wave Pulses in a Polystyrene Well - Water System used for Photomechanical Drug Delivery", *J.O.S.A. B* **22** (5), 1024 - 1036 (May 2005).
7. Y. Fan, G. Spirou, A. Mandelis and I. A. Vitkin, "Laser Photothermoacoustic Frequency-Swept Heterodyned Lock-in Depth Profilometry for Three-Dimensional Subsurface Tissue Imaging", *J. Acoust. Soc. Am.* **116** (6), 3523 - 3533 (December 2004). *Paper selected for inclusion in Virtual Journal of Biological Physics Research* (www.vjbio.org), 8 (12) Dec. 15, 2004.
6. R. J. Jeon, C. Han, A. Mandelis, V. Sanchez and S. H. Abrams, "Diagnosis of Pit & Fissure Caries using Frequency-Domain Infrared Photothermal Radiometry and Modulated Laser Luminescence", *Caries Res.* **38**, 497 – 513 (2004).
5. R. J. Jeon, A. Mandelis, V. Sanchez and S. H. Abrams, "Non-intrusive, non-contacting frequency-domain photothermal radiometry and luminescence depth profilometry of natural carious and artificial sub-surface lesions in human teeth", *J. Biomed. Opt.* **9** (4), 804 – 819 (July/August 2004).
4. R. J. Jeon, A. Mandelis and S. H. Abrams, "Depth profilometric case studies in caries diagnostics of human teeth using modulated laser radiometry and luminescence", *Rev. Sci. Instrum.* **74** (1), 380 - 383 (January 2003).
3. J. A. Balderas-Lopez, M. Moreno-Marquez and A. Mandelis, "Self-Normalized Photoacoustic Thermal Diffusivity Measurements of Dental Resins", *Int. J. Polymeric Mat.* **51**, 639-646 (2002).
2. L. Nicolaidis, C. Feng, A. Mandelis, and S. Abrams, "Quantitative Dental Measurements by use of Simultaneous Frequency-Domain Laser Infrared Radiometry and Luminescence", *Appl. Opt.* **41** (4), 768-777 (February 2002).
1. L. Nicolaidis, A. Mandelis and S. Abrams, "Novel Dental Dynamic Depth Profilometric Imaging using simultaneous Frequency-Domain Infrared Photothermal Radiometry and Laser Luminescence", *J. Biomed. Opt.* **5** (1), 31-39, January 2000.

VII. Diffusion-Wave Physics

15. J. Zhang, C.-H Wang, and A. Mandelis, "Characterization of the thermal-wave field in a wedge-shaped solid using the Green function method", *Int. J. Thermophys.* (submitted February, 2012)
14. A. Mandelis and C. Feng, "Frequency-domain theory of laser infrared photothermal radiometric detection of thermal waves generated by diffuse-photon-density wave fields in turbid media", *Phys. Rev. E* **65**, 021909 (1-19) (2002).
13. C. Wang and A. Mandelis, "Purely Thermal-Wave Interferometry", *J. Appl. Phys.* **85**, Number 12, 8366 - 8377, 15 June 1999.
12. **(Invited)** A. Mandelis, "Diffusion Waves and their Uses", *Physics Today* Vol. **53**, Part I, August 2000, pp. 29-34.
11. A. Mandelis "Many Uses for Diffusion Waves", (Letters), *Physics Today* Vol. **54**, No. 3 (March 2001), pp. 15, 100-102.
10. A. Mandelis, L. Nicolaides and Y. Chen, "Structure and the Reflectionless / Refractionless Nature of Parabolic Diffusion Wave Fields", *Phys. Rev. Lett.* **87** (2), 020801-1 - 020801-4 (9 July 2001).
9. A. Salnick and A. Mandelis, "Hamiltonian Plasma-Harmonic Oscillator Theory: Generalized Depth Profilometry of Electronically Continuously Inhomogeneous Semiconductors and the Inverse Problem", *J. Appl. Phys.* **80** (9), 5278 - 5288, November 1, 1996.
8. A. Mandelis, "Green's Functions in Thermal Wave Physics: Cartesian Coordinate Representations", *J. Appl. Phys.* **78**, 647 - 655, 15 July 1995.
7. A. Mandelis and J.P. Grossman, "Perturbation Theoretical Approach to the Generalized Kubelka Munk Problem in Non homogeneous Optical Media", *Appl. Spectrosc.* **46**, 737 -745, 1992.
6. A. Mandelis, "Theory of Photothermal Wave Diffraction Tomography via Spatial Laplace Spectral Decomposition", *J. Phys. A: Math. General* **24**, 2485 - 2505, June, 1991.
5. A. Mandelis and K.F. Leung, "Photothermal Wave Diffraction and Interference in Condensed Media: Experimental Evidence in Aluminum", *J.O.S.A. A* **8**, 186 - 200, January, 1991.
4. A. Mandelis, "Theory of Photothermal Wave Diffraction and Interference in Condensed Phases", *J.O.S.A. A* **6** (2), 298 - 308, February, 1989.
3. A. Mandelis, "Hamilton Jacobi Formulation and Quantum Theory of Thermal Wave Propagation in the Solid State", *J. Math. Phys.* **26** (10), 2676 - 2683, October, 1985.
2. A. Mandelis and M. Zver, "Theory of the Photopyroelectric Effect in Solids", *J. Appl. Phys.* **57** (9), 4421-4430, May, 1985.
1. A. Mandelis and B.S.H. Royce, "Relaxation Time Measurements in Frequency and Time Domain Photoacoustic Spectroscopy of Condensed Phases", *J.O.S.A.*, **70** (5), 474 480, May, 1980.

VIII. Hydrogen Gas and Environmental Sensors based on Thermal Waves

22. C.-H. Kwan, A. Matvienko and A. Mandelis, "Optimally accurate thermal-wave cavity photopyroelectric measurements of pressure-dependent thermophysical properties of air. Theory and Experiments", *Rev. Sci. Instrum.* **78**, 104902 (1-10) (2007).

21. A. Matvienko and A. Mandelis, "Ultra-high resolution pyroelectric thermal-wave technique for the measurement of thermal diffusivity of low-concentration water-alcohol mixtures", *Rev. Sci. Instrum.* **76**, 104901 (1-8) (2005).
20. C. Wang, A. Mandelis and K. Au-leong, "Physical Mechanism of Reflectance Inversion in Hydrogen Gas Sensor with Pd/PVDF Structures", *Sensors Actuators B* **73**, 100 -105 (2001).
19. C. Wang, A. Mandelis and J. Garcia, "Detectivity Comparison between Thin-Film Pd/PVDF Photopyroelectric Interferometric and Optical Reflectance Hydrogen Sensors", *Rev. Sci. Instrum.* **70**, No.11, 4370 - 4376, November 1999.
18. C. Wang, A. Mandelis and J. A. Garcia, "Pd/PVDF Thin Film Hydrogen Sensor System based on Photopyroelectric Purely-Thermal-Wave Interference", *Sensors Actuators B* **60**, 228 - 237 (1999).
17. **(Invited)** J. Shen, A. Mandelis and T. Ashe, "Pyroelectric Thermal-Wave Resonant Cavity: A Precision Thermal Diffusivity Sensor for Gases and Vapors", *Int. J. Thermophys.* **19**, No. 2, 579 - 593, 1998.
16. A. Mandelis and J. Garcia, "Pd/PVDF Thin Film Hydrogen Sensor based on Laser-Amplitude-Modulated Optical Transmittance: Dependence on H₂ Concentration and Device Physics", *Sensors Actuators B* **49**, 258 - 267 (1998).
15. J.A. Garcia and A. Mandelis, "Study of the Thin-Film Palladium/Hydrogen System by an Optical Transmittance Method", *Rev. Sci. Instrum.* **67**, 3981 - 3983, November 1996.
14. L. Dorojkine and A. Mandelis, "Thermal-Wave Pyroelectric Thin-Film Hydrogen Sensor with Extended Detection Dynamic Range", *Opt. Eng.* **36** (2), 473-481, February 1997.
13. J.A. Garcia, L.M. Dorojkine, A. Mandelis and J.S. Wallace, "Thermophysical Response of Solid-State Thermal-Wave Pyroelectric-Film Sensor to Natural Gas and Methane?", *Int. Hydrogen J.* **21** , No. 9, 761 - 764, 1996.
12. R. Wagner and A. Mandelis, "Separation of Thermal Wave and Optical Reflectance Effects in a Palladium Photopyroelectric Hydrogen Sensor", *Ferroelectrics* **165**, 193 - 203, April 1995.
11. M. Munidasa, A. Mandelis, A. Katz, D.V. Do and V.K. Luong, "Characterization of Purely Thermal-Wave Based Photopyroelectric Gas Sensor for Hydrogen Detection", *Rev. Sci. Instrum.* **65**, 1983 - 1987, June 1994.
10. M. Munidasa and A. Mandelis, "Purely Thermal-Wave based Non-Chemical Photopyroelectric Gas Sensor: Application to Hydrogen", *Rev. Sci. Instrum.* **65**, 1978 -1982, June 1994.
9. C. Christofides, A. Mandelis, J. Rawski and S. Rehm, "Photopyroelectric Detection of Hydrogen/Oxygen Mixtures", *Rev. Sci. Instrum.* **64**, 3563 - 3571, December 1993.
8. C. Christofides, A. Mandelis and J. Enright, "Optimization of a New Photopyroelectric Hydrogen Gas Sensor: Device Geometry and Temperature Measurements", *Jpn. J. Appl. Phys.* **30**, 2916 - 2920, November, 1991.
7. A. Mandelis and C. Christofides, "Photothermal Electrostatics of the Pd PVDF Photopyroelectric (PPE) Hydrogen Gas Sensor", *J. Appl. Phys.* **70**, 4496 - 4505, October, 1991.
6. C. Christofides and A. Mandelis, "Progress in Hydrogen Detection: A New Photopyroelectric Device", *Int. J. Hydrogen Energy* **16**, 577 - 578, 1991.
5. **(Invited Review Paper)** C. Christofides and A. Mandelis, "Solid State Sensors for Trace Hydrogen Gas Detection", *J. Appl. Phys. Reviews* **68**, R1 - R30, September, 1990.
4. A. Mandelis and C. Christofides, "Surface Hydrogen Palladium Studies Using a New Photopyroelectric Detector", *J. Vac. Sci. Technol. A* **8** (6), 3980 - 3983, November/December, 1990.
3. C. Christofides and A. Mandelis, "Operating Characteristics and Comparison of Photopyroelectric and Piezoelectric Sensors for Trace Hydrogen Gas Detection. Part 1: Development of a New Photopyroelectric Sensor", *J. Appl. Phys.* **66** (9), 3975 - 3985, November, 1989.

2. C. Christofides and A. Mandelis, "Operating Characteristics and Comparison of Photopyroelectric and Piezoelectric Quartz Crystal Sensor", J. Appl. Phys. **66** (9), 3986 -3992, November, 1989.

1. A. Mandelis and C. Christofides, "Photopyroelectric (P^2E) Sensor for Trace Hydrogen Gas Detection", Sensors and Actuators B **2**, 79 - 87, March, 1990.

IX. Nonlinear Diffusion-Wave Problems

13. J. Tolev, A. Mandelis and M. Pawlak "Non-linear Dependence of Photocarrier Radiometry Signals from *p*-Si Wafers on Optical Excitation Intensity", J. Electrochem. Soc. **154** (11) H983 – H994 (2007).

12. A. Salnick, J. Opsal, A. Rosencwaig, and A. Mandelis, "Nonlinear Fundamental Photothermal Response: Experimental Results for Tungsten", Solid-State Commun. **114** (2), 133-136, March 2000.

11. A. Mandelis, A. Salnick, L. Chen, J. Opsal and A. Rosencwaig, "Nonlinear Fundamental Photothermal Response in 3D Geometry: Theoretical Model", J. Appl. Phys. **85**, No. 3, 1811 - 1821, 1 February 1999.

10. E.L. Miller, L. Nicolaidis and A. Mandelis, "Nonlinear Inverse Scattering Methods for Thermal Wave Slice Tomography: A Wavelet Domain Approach", J.O.S.A. A. **15**, 1545 -1556, June 1998.

9. R.E. Wagner and A. Mandelis, "Non-Linear Photothermal Modulated Optical-Reflectance and Photocurrent Phenomena in Crystalline Semiconductors: I. Theoretical", Semicond. Sci. Technol. **11**, 289 - 299 (1996).

8. R.E. Wagner and A. Mandelis, "Nonlinear Photothermal Modulated Optical Reflectance and Photocurrent Phenomena in Crystalline Semiconductors: II Experimental", Semicond. Sci. Technol. **11**, 300 - 307 (1996).

7. K. Annapurna, J.V. Satayanarayana, S. Buddhudu and A. Mandelis, "Non-Linearity-Elastic Properties of the Lasing Transition ${}^4F_{3/2}$ - to - ${}^4I_{11/2}$ of Nd^{3+} - Doped Semiconducting Glasses", J. Alloys Compounds **216** (2), 281 - 283, 1995.

6. G. Amaranath, S. Buddhudu and A. Mandelis, "Nonlinearity and Elastic Properties of $Cr^{(3+)}:Al_2O_3$ and $Ti^{(3+)}: Al_2O_3$ Laser Crystals", Solid State Commun. **91**, 9, 761-763, 1994.

5. R.E. Wagner and A. Mandelis, "Intensity-Dependence of the Photorefectance Amplitude in Semiconductors", Phys. Rev. B **50**, 14228 - 14236, November 15, 1994-I.

4. V. Gusev, A. Mandelis and R. Bleiss, "Theory of Combined Acousto-Photo-Thermal Spectral Decomposition in Condensed Phases: Parametric Generation of Thermal Waves by a Non-Stationary ("Breathing") Sub-Surface Defect", Mat. Sci. Eng. B **26**, 121 - 132, October 1994.

3. V. Gusev, A. Mandelis and R. Bleiss, "Non-Linear Photothermal Response of Thin Solid Films and Coatings", Mat. Sci. Eng. B **26**, 111 - 119, October 1994.

2. V. Gusev, A. Mandelis and R. Bleiss, "Theory of Strong Photothermal Nonlinearity from Sub surface Non Stationary ("Breathing") Cracks in Solids", Appl. Phys. A. **57**, 229 - 233, Sept. 1993.

1. V. Gusev, A. Mandelis and R. Bleiss, "Theory of Second Harmonic Thermal Wave Generation: 1 D Geometry", Int. J. Thermophys. **14**, 321 - 337 March 1993.

X. Specialty Applications of Photothermal Diagnostics and Thin Films

17. K. Horne, H. Ban, A. Mandelis and A. Matvienko, "Photothermal Radiometry Measurement of Thermophysical Property Change of an Ion-irradiated Sample", MATERIALS SCIENCE AND ENGINEERING B-ADVANCED FUNCTIONAL SOLID-STATE MATERIALS **177** (2), 164 - 167 (February 2012) DOI: 10.1016/j.mseb.2011.10.

16. A. Mandelis, L. Li, N. Baddour, R. C. Tennyson and W. D. Morrison, "Quantitative measurements of sliding friction coefficients of tribological interfaces with a new differential infrared radiometric instrument", *Rev. Sci. Instrum.* **74** (1), 407 - 410 (January 2003).
15. L. Li, A. Mandelis, J. A. Garcia-Hercules and C. Eccles, "Infrared-Radiometry-based Background Compensated Thermometric Instrument for Non-Contact Temperature and Friction Measurements", *Rev. Sci. Instrum.* **72** (5), 2483 - 2489 (May 2001).
14. J.A. Garcia, A. Mandelis, M. Marinova, K. Michaelian and S. Afrashtehfar, "Quantitative Photothermal Radiometric and FTIR Photoacoustic Measurements of Specialty Papers", *Appl. Spectrosc.* **52**, No. 9, 1222 - 1229, 1998.
13. A. Othonos, A. Mandelis, M. Nestoros and C. Christofides, "Laser Photothermal Diagnostics of Genuine and Counterfeit British and U.S. Banknotes", *Opt. Eng.* **36** (2), 400 - 407, February 1997.
12. A. Mandelis, K. McAllister, C. Christofides and C. Xenofontos, "A Pilot Study in Non-intrusive Laser Photothermal Archaeometry of Ancient Statuary Pedestal Stones from Cyprus", *Archaeometry* **37**, (2), 257 - 270, June 1995.
11. J. Shen, A. Mandelis, A. Othonos, and J. Vanniasinkam, "High Resolution Quadrature Photopyroelectric Spectroscopy of a-Si:H Thin Films deposited on Silicon Wafers", *Appl. Spectrosc.* **49**, 819 - 824, 1995.
10. A. Mandelis, R. Takaue, Z. Chen, J. Szurmak and W.D. Baines, "Quantitative Laser Beam Deflection Study of Liquid Liquid Interdiffusion in the Water Sugar System", *Anal. Sci.* **8**, 131 - 136, April, 1992.
9. C. Christofides, A. Mandelis and A. Engel, "Quantitative Photopyroelectric Out of Phase Spectroscopy of Amorphous Silicon Thin Films Deposited on Crystalline Silicon", *Can. J. Phys.* **69**, 317 - 323, April, 1991.
8. A. Mandelis, R.E. Wagner, K. Ghandi, R. Baltman and P. Dao, "Photopyroelectric Spectroscopy (P²ES) of a Si:H Thin Semiconducting Films on Quartz", *Phys. Rev. B* **39**, 5254 - 5260, March 15, 1989 I.
7. J.F. Power and A. Mandelis, "Photopyroelectric Thin Film Instrumentation and Impulse Response Detection. Part I: A Theoretical Model", *Rev. Sci. Instrum.* **58** (11), 2018 - 2023, November, 1987.
6. J.F. Power and A. Mandelis, "Photopyroelectric Thin Film Instrumentation and Impulse Response Detection. Part II: Methodology", *Rev. Sci. Instrum.* **58** (11), 2024 - 2032, November, 1987.
5. J.F. Power and A. Mandelis, "Photopyroelectric Thin Film Instrumentation and Impulse Response Detection. Part III: Performance and Signal Recovery Techniques", *Rev. Sci. Instrum.* **58** (11), 2033 - 2043, November, 1987.
4. J. Pawliszyn, M.F. Weber, M.J. Dignam, A. Mandelis, R.D. Venter and S. M. Park, "Selective Observation of Concentration Gradients by the Laser Beam Deflection Sensor Applied to In Situ Electrochemical Studies. A Novel Approach", *Anal. Chem.* **58**, 239 -242, January, 1986.
3. J. Pawliszyn, M.F. Weber, M.J. Dignam, A. Mandelis, R.D. Venter and S. M. Park, "Observation of Concentration Gradients by the Laser Beam Deflection Sensor", *Anal. Chem.* **58**, 236 - 239, January, 1986.
2. R.E. Wagner, V.K.T. Wong and A. Mandelis, "Photothermal Deflection Spectroscopy and Photoconductivity Studies of Photoelectrochemical Processes at (0001) n-CdS/Electrolyte Interfaces", *Analyst* **111**, 299 - 304, March, 1986.
1. A. Mandelis, E. Siu and S. Ho, "Photoacoustic Spectroscopy of Thin SiO₂ Films Grown on (100) Si Substrates: A Thermal Interferometric Technique Complementary to Optical Interferometry", *Appl. Phys. A.* **33**, 153 - 159, March, 1984.

XI. Optical Property Measurements using Diffusion Waves. Optical and Optoelectronic Materials. Nonradiative Physics and Processes

34. L. Nicolaides, Y. Chen, A. Mandelis and I. A. Vitkin, "Theoretical, Experimental and Computational Aspects of Optical Property Determination of Turbid Media using Frequency-Domain Laser Infrared Photothermal Radiometry", J.O.S.A. A **18** (10), 2548 -2556 (October 2001).
33. C. Wang and A. Mandelis, "Deconvolution and Measurement of Bulk and Surface Optical Absorptions in Ti:Al₂O₃ Crystals using Photopyroelectric Interferometry", Rev. Sci. Instrum. **70**, Number 7, 3115 - 3124, July 1999.
32. J. Vanniasinkam, M. Munidasa, A. Othonos, M. Kokta and A. Mandelis, "Diagnostics of Nonradiative Defects in the Bulk and Surface of Brewster-Cut Ti: Sapphire Laser Materials Using Photothermal Radiometry", IEEE J. Quant. Electron. **33**, No. 12, 2301 -2310, December 1997.
31. J. Vanniasinkam, A. Mandelis, M. Munidasa and M. Kokta, "Deconvolution of Surface and Direct Metastable-State Blackbody Emission in Ti: Sapphire Laser Materials Using Boxcar Time-Domain Photothermal Radiometry", J.O.S.A. B **15**, No. 6, 1647 - 1655, June 1998.
30. A. Mandelis and J. Vanniasinkam, "Theory of Nonradiative Decay Dynamics in Intensely Pumped Solid-State Laser Media via Laser Photothermal Diagnostics", J. Appl. Phys. **80**, No. 11, 6107 - 6119, December 1996.
29. J. Shen, K. Fjeldsted, J. Vanniasinkam and A. Mandelis, "Surface Polish Characterization of Industrial Ti: Sapphire Laser Crystal Rods by Photopyroelectric Scanning Imaging", Opt. Materials **4**, 823 - 831, October 1995.
28. A. Mandelis and M. Grinberg, "Ultrasensitive Quadrature Photopyroelectric Quantum Yield Spectroscopy of Ti³⁺:Al₂O₃: Evidence for Domination of De-excitation Mechanism by Inter-Configurational Nonradiative Transitions in an Unthermalized Manifold", Chem. Phys. Lett. **238**, 65 - 70, 26 May 1995.
27. **(Invited)** A. Mandelis and A. da Silva, "Quantitative in-situ Photopyroelectric Spectroscopy of Optoelectronic Quantum Structures. Theory and Experiment with Al_{0.6}Ga_{0.4}As/GaAs Quantum Wells. Ferroelectrics **165**, 1-26, April 1995.
26. S. Buddhudu, A. Mandelis, B. Joseph and K. Fjeldsted, "Non-Radiative Energy Conversion Efficiency and Imaging of Growth Defects in Ti³⁺:Al₂O₃ Crystals Using Quadrature Photopyroelectric Detection", Opt. Materials **3**, 115 - 121, June 1994.
25. J. Vanniasinkam, A. Mandelis, S. Buddhudu and M. Kokta, "Photopyroelectric Deconvolution of Bulk and surface Optical Absorption and Non-Radiative Energy Conversion Efficiency Spectra in Ti³⁺:Al₂O₃ Crystals", J. Appl. Phys. **75**, 8090 - 8097, June 1994.
24. M. Grinberg and A. Mandelis, "Photopyroelectric Quantum Yield Spectroscopy and Quantum Mechanical Photo-excitation Decay Kinetics of the Ti³⁺ ion in Al₂O₃", Phys. Rev. B1 **49**, 12496-12506, May 1994.
23. M. Grinberg and A. Mandelis, "Non-Radiative Fast Processes and Quantum Efficiency of Transition Metal Ions in Solids", J. Luminesc. **58**, 307-310, (1994).
22. A. Mandelis, J. Vanniasinkam, S. Buddhudu, A. Othonos and M. Kokta, "Absolute Non-Radiative Energy Conversion Efficiency Spectra in Ti³⁺:Al₂O₃ Crystals Measured by Non-Contact Quadrature Photopyroelectric Spectroscopy", Phys. Rev. B **48**, 6808 - 6821, 1 Sept. 1993-II.
21. **(Invited)** A. Mandelis, Z. H. Chen and R. Bleiss, "Quantum Efficiency and Metastable Lifetime Measurements in Solid State Laser Materials Via Lock in Rate Window Photothermal Radiometry: Technique and Application to Ruby (Cr³⁺: Al₂O₃), Opt. Eng.; Special Issue on "Optical Science and Engineering in Canada", **32**, 2046 - 2053, Sept. 1993.
20. M. Grinberg, A. Mandelis and K. Fjeldsted, "Theory of Inter Configurational Non- Radiative Transition Metal Ions in Solids and Application to Ti³⁺:Al₂O₃ System", Phys. Rev B. **48**, 5935 - 5944, Sept. 1993-I.
19. M. Grinberg, A. Mandelis, K. Fjeldsted and A. Othonos, "Spectroscopy and Analysis of Radiative and Non Radiative Processes in Ti³⁺:Al₂O₃ Crystals", Phys. Rev. B **48**, 5922 -5934, Sept. 1993-I.
18. A. Mandelis, M. Munidasa and A. Othonos, "Single Ended Infrared Photothermal Radiometric Measurement of Quantum Efficiency and Metastable Lifetime in Solid State Laser Materials: The Case of Ruby (Cr³⁺: Al₂O₃), IEEE J. Quant. Electron. **29**, 1498 -1504, June 1993.

17. **(Invited Review Paper)** A. Mandelis, "Photothermal Measurements of Internal Quantum and Energy Efficiencies of Semiconductor Photoelectrodes. A Review", *Anal. Sci. (Chem. Soc. Jpn)*. **6**, 491 - 503, August, 1990.
16. C. Christofides, A. Engel and A. Mandelis, "Optical Absorption Coefficient and Non radiative Quantum Efficiency Photopyroelectric Spectra of Pure Silicon from a Single Modulation Frequency", *Ferroelectrics* **118**, 411 - 424, 1991.
15. A. Mandelis, F. Boroumand and H. van den Bergh, "Quantitative Diffuse Reflectance and Transmittance Spectroscopy of Powders", *Spectrochem. Acta*, **47A**, 943 - 971, July, 1991, **(Nominated for the 1991 Harold Thompson Award, Am. Chem. Soc.)**
14. A. Mandelis, F. Boroumand and H. van den Bergh, "Quantitative Diffuse Reflectance of Large Powders; The Melamed Model Revisited", *Appl. Opt.* **29**, 2853 - 2860, July, 1990.
13. S.B. Peralta and A. Mandelis, "Optical Saturation in the Photothermal Spectroscopy of Fluorescent Materials", *Appl. Phys. A* **50** (4), 353 - 356, April, 1990.
12. R.E. Wagner and A. Mandelis, "A Photothermal Deflection Method for Monitoring Photoelectronic and Nonradiative Energy Conversion in Semiconductor Photoelectrochemical Cells", *Phys. Rev. B* **38**, 9920 - 9927, 15 November, 1988.
11. R.E. Wagner and A. Mandelis, "Photothermal Beam Deflection and Photoaction Spectroscopic Study of CdS Photoelectrodes in Polysulfide Electrolyte", *Appl. Spectrosc.* **43** (2), 209 - 219, February, 1989.
10. A. Mandelis and E.K.M. Siu, "Combined Photoacoustic and Photoconductive Spectroscopic Investigation of Non Radiative Recombination and Electronic Transport Phenomena in Crystalline n CdS. I. Experiment", *Phys. Rev.* **B34**, 7209 - 7221, November, 1986.
9. E.K.M. Siu and A. Mandelis, "Combined Photoacoustic and Photoconductive Spectroscopic Investigation of Non Radiative Recombination and Electronic Transport Phenomena in Crystalline n CdS. II. Theory", *Phys. Rev.* **B34**, 7222 - 7233, November, 1986.
8. J.T. Dodgson, A. Mandelis and C. Andreetta, "Optical Absorption Coefficient Measurements in Solids and Liquids Using Correlation Photoacoustic Spectroscopy (CPAS)", *Can. J. Phys.* **64**, 1074 - 1080, September, 1986.
7. A. Mandelis and J.T. Dodgson, "Spectroscopic Studies of Solids via Correlation Photoacoustic Spectroscopy", *J. Phys. C: Solid State Phys.* **19** (13), 2329 - 2351, May, 1986.
6. A. Mandelis and B.S.H. Royce, "Fundamental Mode Laser Beam Propagation in Optically Inhomogeneous Electrochemical Media with Chemical Species Concentration Gradients", *Appl. Opt.* **23** (17), 2892 - 2901, September, 1984.
5. A. Mandelis, "Self Consistent Semi Classical Theory of Non radiative Capture and Emission Statistics in Defect Semiconductors", *Phys. Status Solid, (b)* **122**, 687 - 701, May, 1984.
4. A. Mandelis, "Theory of Solid State Photoacoustic Signal Source Generation via Nonradiative Lattice Phonon Assisted De Excitations", *Chem. Phys.* **81**, 185 - 197, October, 1983.
3. A. Mandelis, "Absolute Optical Absorption Coefficient Measurements Using Transverse Photothermal Deflection Spectroscopy", *J. Appl. Phys.* **54**, 6, (1983), 3404 - 3409, June, 1983.
2. A. Mandelis, "Photoacoustic Determination of the Non radiative Quantum Efficiency of Uranyl Formate Monohydrate, $\text{UO}_2(\text{HCOO})_2 \cdot \text{H}_2\text{O}$, Powders", *Chem. Phys. Lett.* **91**, 6, 501 - 505, October, 1982.
1. A. Mandelis and B.S.H. Royce, "Non Radiative Lifetime Measurements in Time Domain Photoacoustic Spectroscopy of Condensed Phases", *J. Appl. Phys.* **51** (1), 610 - 615, January, 1980.

III. PAPERS IN REFEREED CONFERENCE PROCEEDINGS

Total Refereed Proceedings Publications to-date (*):

174

(*) Note: SPIE Proceedings papers are editor refereed only

1. A. Mandelis and B.S.H. Royce, "Relaxation Time Measurements in Frequency and Time Domain Photoacoustic Spectroscopy of Condensed Phases", Proceedings of Topical Meeting on Photoacoustic Spectroscopy, August 1-3, 1979. Ames, Iowa. (Sponsored by The Optical Society of America).
2. A. Mandelis and J.F. Zucco, "Infrared Laser Photoacoustic Spectroscopy of Ion-Implanted (100) Si", Third International Conference on Infrared Physics, ETH Zurich, Switzerland, July 23-27, 1984; Proceedings, pp. 787-789.
3. R.E. Wagner, V.K.T. Wong and A. Mandelis, "Photothermal Deflection Spectroscopy and Photoconductivity Studies of Photoprocesses at Single Crystal CdS-Electrolyte Interfaces", 4th International Topical Meeting on Photoacoustic, Thermal and Related Sciences, August 4-8, 1985; Ville d'Estérel, Quebec; Technical Digest, pp. MD8.1-MD8.4.
4. J.T. Dodgson and A. Mandelis, "Experimental and Theoretical Spectroscopic Investigations of Condensed Phases Using Correlation Photoacoustic Spectroscopy", 4th International Topical Meeting on Photoacoustic, Thermal and Related Sciences, August 4-8, 1985; Ville d'Estérel, Quebec; Technical Digest, pp. TuA5.1-TuA5.5.
5. A. Mandelis, "Photopyroelectric Spectroscopy of Solids and Liquids (PPES)", 4th International Topical Meeting on Photoacoustic, Thermal and Related Sciences, August 4-8, 1985; Ville d'Estérel, Quebec; Technical Digest, pp. TuB8.1-TuB8.4.
6. E. Siu and A. Mandelis, "Studies of Electronic Transport Properties in Crystalline CdS via Photoacoustic Spectroscopy", 4th International Topical Meeting on Photoacoustic, Thermal and Related Sciences, August 4-8, 1985; Ville d'Estérel, Quebec; Technical Digest, pp. WD11.1-WD11.3.
7. **(Invited)** A. Mandelis, "Classical and Quantum Mechanical Theory of Thermal Wave Physics", Proc. Review of Progress in Quantitative NDE 1986, D.I. Thompson, Ed. (Plenum Press, New York, 1987), pp. 227-235.
8. A. Mandelis, "FM Time Delay-Domain and Pseudo-Random Noise Thermal Wave Techniques", Proc. Review of Progress in Quantitative NDE 1986, D.O. Thompson, Ed. (Plenum Press, New York, 1987), pp. 799-806.
9. **(Invited)** A. Mandelis and J.F. Power, "Frequency Modulation Time Delay Photopyroelectric Spectrometry", Proc. 5th International Topical Meeting on Photoacoustic and Photothermal Phenomena, July 27-30, 1987; P. Hess and J. Pelzl, Eds., Springer-Verlag, Berlin Heidelberg, 1988; pp. 456-463.
10. A. Mandelis, W. Lo and R.E. Wagner, "Photopyroelectric Spectroscopy (P^2ES) of Electronic Defect Centers in Crystalline n-CdS", Proc. 5th International Topical Meeting on Photoacoustic and Photothermal Phenomena, July 27-30, 1987; P. Hess and J. Pelzl, Eds., Springer-Verlag, Berlin Heidelberg, 1988; pp. 35-40.
11. R.E. Wagner and A. Mandelis, "Characterization of n-CdS/Polysulfide Photoelectrochemical Cells via Photothermal Deflection and Photoaction Spectroscopies", Proc. 5th International Topical Meeting on Photoacoustic and Photothermal Phenomena, July 27-30, 1987; P. Hess and J. Pelzl, Eds., Springer-Verlag, Berlin Heidelberg, 1988; pp. 41-43.
12. A. Mandelis and J.F. Power, "Impulse Photothermal Evaluation of Materials via Frequency Modulated Optical Reflectance I: Theory", Proc. Review of Progress in Quantitative NDE 1988, D.O. Thompson and D.E. Chimenti, Eds. Vol. 8A, (Plenum Press, New York, 1989), pp. 613-618.
13. J.F. Power and A. Mandelis, "Impulse Photothermal Evaluation of Materials via Frequency Modulated Optical Reflectance II: Experimental", Proc. Review of Progress in Quantitative NDE 1988, D.O. Thompson and D.E. Chimenti, Eds. Vol. 8A, (Plenum Press, New York, 1989), pp. 619-625.
14. R.E. Wagner and A. Mandelis, "A Photothermal Deflection Method of Monitoring Photoelectronic and Nonradiative

- Energy Conversion in Semiconductor Photoelectrochemical Cells", Proc. Review of Progress in Quantitative NDE 1988, D.O. Thompson and D.E. Chimenti, Eds. Vol. 8B, (Plenum Press, New York, 1989), pp. 1211-1218.
15. **(Invited)** A. Mandelis, R.E. Wagner, K. Ghandi, R. Baltman, and P. Dao, "Photopyroelectric Spectroscopy (P^2ES) of a-Si:H Thin Semiconducting Films on Quartz", Proc. Review of Progress in Quantitative NDE 1988, D.O. Thompson and D.E. Chimenti, Eds. Vol. 8B, (Plenum Press, New York, 1989), pp. 1255-1262.
 16. R.E. Wagner and A. Mandelis, "Photothermal Deflection Method for Monitoring Photoelectronic and Nonradiative Energy Conversion in Semiconductor Photoelectrochemical (PEC) Cells", Proc. 6th International Topical Meeting on Photoacoustic and Photothermal Phenomena, July 30 - August 3, 1989; J. Murphy, J.W. Maclachlan-Spicer, L.C. Aamodt and B.S.H. Royce, Eds., (Springer-Verlag, Berlin, 1990), pp. 113-116.
 17. M. Mieszkowski and A. Mandelis, "Photopyroelectric Computerized Scanner for Contactless Spatially-Resolved Detection of Thermal Waves", Proc. 6th International Topical Meeting on Photoacoustic and Photothermal Phenomena, July 30 - August 3, 1989; J. Murphy, J.W. Maclachlan-Spicer, L.C. Aamodt and B.S.H. Royce, Eds., (Springer-Verlag, Berlin, 1990), pp. 507-510.
 18. A. Mandelis, R.E. Wagner, K. Ghandi, R. Baltman and P. Dao, "Photopyroelectric Spectroscopy (PPES) of a-Si:H Thin Films on Quartz", Proc. 6th International Topical Meeting on Photoacoustic and Photothermal Phenomena, July 30 - August 3, 1989; J. Murphy, J.W. Maclachlan-Spicer, L.C. Aamodt and B.S.H. Royce, Eds., (Springer-Verlag, Berlin, 1990), pp. 110-112.
 19. A. Mandelis and K.F. Leung, "Photothermal Wave Diffraction and Interference in Condensed Media", Proc. 6th International Topical Meeting on Photoacoustic and Photothermal Phenomena, July 30 - August 3, 1989; J. Murphy, J.W. Maclachlan-Spicer, L.C. Aamodt and B.S.H. Royce, Eds., (Springer-Verlag, Berlin, 1990), pp. 511-513.
 20. C. Christofides, I.A. Vitkin and A. Mandelis, "Temperature Effect on Photothermal Reflectance Signal: Application to Ion Implanted and Amorphous Silicon", Proc. 6th International Topical Meeting on Photoacoustic and Photothermal Phenomena, July 30 - August 3, 1989; J. Murphy, J.W. Maclachlan-Spicer, L.C. Aamodt and B.S.H. Royce, Eds., (Springer-Verlag, Berlin, 1990), pp. 149-152.
 21. I.A. Vitkin, C. Christofides and A. Mandelis, "Study of the Induced Damage and of the Annealing Kinetics of Defects in Ion Implanted Silicon Using the Photothermal Reflectance Technique", Proc. 6th International Topical Meeting on Photoacoustic and Photothermal Phenomena, July 30 - August 3, 1989; J. Murphy, J.W. Maclachlan-Spicer, L.C. Aamodt and B.S.H. Royce, Eds., (Springer-Verlag, Berlin, 1990), pp. 153-155.
 22. S.B. Peralta, I.A. Vitkin, K. Ghandi and A. Mandelis, "Photopyroelectric Impulse Response Investigation of Single Crystal $YBa_2Cu_3O_{7-x}$ ", Proc. 6th International Topical Meeting on Photoacoustic and Photothermal Phenomena, July 30 - August 3, 1989; J. Murphy, J.W. Maclachlan-Spicer, L.C. Aamodt and B.S.H. Royce, Eds., (Springer-Verlag, Berlin, 1990), pp. 211-213.
 23. A. Mandelis, F. Boroumand, H. Solka, J. Highfield and H. van den Bergh", Fourier Transform Infrared Photopyroelectric Spectroscopy of Solids: A New Technique", Proc. 6th International Topical Meeting on Photoacoustic and Photothermal Phenomena, July 30 - August 3, 1989; J. Murphy, J.W. Maclachlan-Spicer, L.C. Aamodt and B.S.H. Royce, Eds., (Springer-Verlag, Berlin, 1990), pp. 504,506.
 24. S.B. Peralta and A. Mandelis, "Optical Saturation in the Photothermal Spectroscopy of Fluorescent Materials", Proc. 6th International Topical Meeting on Photoacoustic and Photothermal Phenomena, July 30 - August 3, 1989; J. Murphy, J.W. Maclachlan-Spicer, L.C. Aamodt and B.S.H. Royce, Eds., (Springer-Verlag, Berlin, 1990), pp. 406-408.
 25. A. Mandelis and C. Christofides, "Photopyroelectric Solid State Sensor for Hydrogen Gas Trace Detection", Proc. 6th International Topical Meeting on Photoacoustic and Photothermal Phenomena, July 30 - August 3, 1989; J. Murphy, J.W. Maclachlan-Spicer, L.C. Aamodt and B.S.H. Royce, Eds., (Springer-Verlag, Berlin, 1990), pp. 347-350.
 26. C. Christofides and A. Mandelis, "Photopyroelectric Pd-PVDF Hydrogen Sensor", Proc. IEEE 1989 Ultrasonics Symp. 3-6 Oct. 1989, Vol. 1, pp. 613 - 616 (1989).

27. I.A. Vitkin, C. Christofides and A. Mandelis, "Photothermal Reflectance Investigation of Implanted Silicon", Proc. Surface Engr., June 25-27, 1990; S.A. Meguid, Ed., (Elsevier Sci, Publ. Ltd., London, 1990), pp. 22-28.
28. C. Christofides and A. Mandelis, "Hydrogen Detection by a Palladium Coated Piezoelectric Quartz Crystal: Device Capabilities and Laminations", Proc. CSME Mech. Engr. Forum 1990, June 3-9, 1990, Toronto, pp. 467-470.
29. S.B. Peralta and A. Mandelis, "High Detectivity Thin-Film Pyroelectric Bimorph Calorimeter", Proc. CSME Mech. Engr. Forum 1990, June 3-9, 1990, Toronto, pp. 443-447.
30. A. Mandelis and K.F. Leung, "Photothermal-Wave Diffraction and Interference in Condensed Media: Experimental Evidence in Aluminum", Proc. Int. Symp. Physical Acoustics, Katholieke Universiteit Leuven, Campus Kortrijk, Belgium, June 19-22 (1990), (O. Leroy and M.A. Breazeale, Eds.) Plenum, N.Y., pp. 489-495, 1991.
31. A. Mandelis and C. Christofides, "Photopyroelectric Pd-PVDF Solid-State Hydrogen Sensor", Proc. Project Hydrogen '91 (T.N. Veziroglu and R.E. Billings, Eds.), February 1992, pp. 355-366.
32. **(Invited)** A. Mandelis and S.B. Peralta, "Thermal-Wave Based Materials Characterization and Nondestructive Evaluation of High-Temperature Superconductors: A Critical Review", Proc. NATO Advanced Study Int., August 1991, Halkidiki, Greece, in *Physics and Materials Science of High Temperature Superconductors II*; (R. Kossowsky, B. Raveau, D Wohleben and S.K. Patapis, Eds.; Kluwer, Dordrecht, The Netherlands, 1992) pp. 413-440.
33. A. Mandelis and C. Christofides, "Photothermal Electrostatics of the Pd-PVDF Photopyroelectric Hydrogen Gas Sensor", in *Photoacoustic and Photothermal Phenomena III*, Proc. 7th International Topical Meeting on PA and PT Phenomena, Doorwerth, The Netherlands, August 26-30, 1991; D. Bicanic, Ed. (Springer-Verlag, Berlin 1992), pp. 6-8.
34. A. Mandelis, E. Schoubs, S.B. Peralta and J. Thoen, "Photoacoustic Depth Profiling of Continuously Inhomogeneous Condensed Phases, and Application to the Liquid Crystal Octylcyanobiphenyl (8 CB)", in *Photoacoustic and Photothermal Phenomena III*, Proc. 7th International Topical Meeting on PA and PT Phenomena, Doorwerth, The Netherlands, August 26-30, 1991; D. Bicanic, Ed. (Springer-Verlag, Berlin 1992), pp. 186-188.
35. R.E. Wagner and A. Mandelis, "Photomodulated Optical-Reflectance Studies of Germanium: Diagnostic Separation of Temperature and Free-Carrier Effects", in *Photoacoustic and Photothermal Phenomena III*, Proc. 7th International Topical Meeting on PA and PT Phenomena, Doorwerth, The Netherlands, August 26-30, 1991; D. Bicanic, Ed. (Springer-Verlag, Berlin 1992), pp. 372-374.
36. C. Christofides and A. Mandelis, "Out-of-Phase Photopyroelectric (PPE) Spectroscopy of Amorphous Semiconductors", in *Photoacoustic and Photothermal Phenomena III*, Proc. 7th International Topical Meeting on PA and PT Phenomena, Doorwerth, The Netherlands, August 26-30, 1991; D. Bicanic, Ed. (Springer-Verlag, Berlin 1992), pp. 417-419.
37. M. Munidasa and A. Mandelis, "Photopyroelectric Thermal Wave Spatial and Depth Resolved Imaging with Ray Optic Tomographic Reconstruction", in *Photoacoustic and Photothermal Phenomena III*, Proc. 7th International Topical Meeting on PA and PT Phenomena, Doorwerth, The Netherlands, August 26-30, 1991; D. Bicanic, Ed. (Springer-Verlag, Berlin 1992), pp. 550-552.
38. Z. Chen and A. Mandelis, "Rate-Window Transient Thermomodulation Spectrometry: Technique and Measurements in Semiconductors", in *Photoacoustic and Photothermal Phenomena III*, Proc. 7th International Topical Meeting on PA and PT Phenomena, Doorwerth, The Netherlands, August 26-30, 1991; D. Bicanic, Ed. (Springer-Verlag, Berlin 1992), pp. 556-558.
39. **(Invited)**: A. Mandelis, "Photothermal Detection at Surfaces and Interfaces: Developments in Non-Conventional Diagnostics", in *Photoacoustic and Photothermal Phenomena III*, Proc. 7th International Topical Meeting on PA and PT Phenomena, Doorwerth, The Netherlands, August 26-30, 1991; D. Bicanic, Ed. (Springer-Verlag, Berlin 1992), pp. 657-663.
40. F. Funak, A. Mandelis and M. Munidasa, "Photothermal Frequency-Domain Depth Profilometry of a Discrete Inhomogeneous Surface Layer on Homogeneous Substrate", Proc. 8th Int. Topical Meeting on Photoacoustic and

Photothermal Phenomena, J. Physique IV, Colloque **C7**, 95-98 (1994).

41. O Padé and A. Mandelis, "Thermal-Wave Slice Tomography Using Wave Field Reconstruction", Proc. 8th Int. Topical Meeting on Photoacoustic and Photothermal Phenomena, J. Physique IV, Colloque **C7**, 99-102 (1994).
42. A. Mandelis and R. Bliess, "High-Resolved Separation of Carrier and Thermal Wave Contributions to Photothermal Signals from Cr-doped Silicon Using Rate-Window Infrared Radiometry", Proc. 8th Int. Topical Meeting on Photoacoustic and Photothermal Phenomena, J. Physique IV, Colloque **C7**, 137-140 (1994).
43. R.E. Wagner and A. Mandelis, "Quantitative Photomodulated Thermoflectance Studies of Germanium and Silicon Semiconductors", Proc. 8th Int. Topical Meeting on Photoacoustic and Photothermal Phenomena, J. Physique IV, Colloque **C7**, 141-144 (1994).
44. D. Wolff, H.D. Geiler and A. Mandelis, "A Rigorous Description of Electrodynamical and Photothermal Response by the Matrix Formalism in Layered System", Proc. 8th Int. Topical Meeting on Photoacoustic and Photothermal Phenomena, J. Physique IV, Colloque **C7**, 179-182 (1994).
45. A. Mandelis, J. Vanniasinkam and S. Buddhudu, "Absolute Non-Radiative Energy Conversion Efficiency Spectra in $Ti^{3+}:Al_2O_3$ Crystals Measured by Non-Contact Quadrature Photopyroelectric Spectroscopy", Proc. 8th Int. Topical Meeting on Photoacoustic and Photothermal Phenomena, J. Physique IV, Colloque **C7**, 393-396 (1994)
46. A. Mandelis, Z.H. Chen and R. Bliess, "Quantum Efficiency and Metastable Lifetime Measurements in Ruby ($Cr^{3+}:Al_2O_3$) via Lock-in-Rate Window Photothermal Radiometry", Proc. 8th Int. Topical Meeting on Photoacoustic and Photothermal Phenomena, J. Physique IV, Colloque **C7**, 401-404 (1994)
47. C. Christofides and A. Mandelis, "Photopyroelectric Detection of Hydrogen/Oxygen Mixtures", Proc. 8th Int. Topical Meeting on Photoacoustic and Photothermal Phenomena, J. Physique IV, Colloque **C7**, 511-513 (1994).
48. M. Munidasa, A. Mandelis and A. Katz, "Purely Thermal-Wave Based Non-Chemical Photothermal Phenomena, J. Physique IV, Colloque **C7**, 515-518 (1994).
49. A. Mandelis, F. Funak and M. Munidasa, "A Generalized Photoacoustic Methodology for Thermal Diffusivity Profile Reconstructions in Two-Layered Solids, *Acustica* **82**, Suppl. 1, S119 (1996); Proc. Forum Acusticum 1996, Antwerp, Belgium.
50. **(Invited)** Budiman, R.A., Mandelis, A., Koutzarov, I.P., Ruda, H.E. and Shen, J., "Noncontact Photothermal Radiometric Deep-Level Transient Spectroscopy of Undoped Semi-Insulating GaAs", Proc. 9th Int. Conf. Photoacoustic Photothermal Phenomena, Nanjing, China; in *Progr. Natural Sci.*, Vol. 6, Supplement, pp. 494-497, 1996.
51. Shen, J. and Mandelis, A., "Thermal-wave-resonant-cavity Measurements of the Thermal Diffusivity of Air", Proc. 9th Int. Conf. Photoacoustic Photothermal Phenomena, Nanjing, China; in *Progr. Natural Sci.*, Vol. 6, Supplement, pp. 727-730, 1996.
52. Salnick, A., Jean, C. and Mandelis, A., "Noncontacting Photothermal Radiometry of MOS Capacitor Structures: The Frequency-Domain and DLTS Approaches", *Review of Progress in QNDE*, Proceedings of the Twenty-Third Symposium held in Brunswick, Maine, July 28-August 2, 1996, Edited by Donald O. Thompson and Dale E. Chimenti, Iowa State University, Ames, Plenum Press, Vol. 16B, pp. 2137-2144, 1997.
53. Salnick, A., Mandelis, A., Othonos, A. and Christofides, C., "Noncontact Lifetime Reconstruction in Continuously Inhomogeneous Semiconductors: Generalized Theory and Experimental Results for Ion-Implanted Si", *Review of Progress in QNDE*, Proceedings of the Twenty-Third Symposium held in Brunswick, Maine, July 28-August 2, 1996, Edited by Donald O. Thompson and Dale E. Chimenti, Iowa State University, Ames, Plenum Press, Vol. 16A, pp. 371-378, 1997.
54. **(Keynote paper)** "Advances in Lock-in Amplifier Signal Processing Optimization: Signal-to-Noise Ratio, NDE Measurement Methodologies and Case Studies with Thermal Wave", *Topics on Nondestructive Evaluation Series*,

- Proc. III Int. Workshop on Advances in Signal Processing for Non-Destructive Evaluation of Materials, Univ. Laval, Quebec City, August 5-8, 1997, Edited by Xavier P. V. Maldague, ASNDT Press, Vol. 3, pp. 3-17, 1998.
55. **(Invited paper)** Nicolaides L., Munidasa M. and Mandelis, A., "Thermal-Wave Diffraction Tomographic Microscopy", Proc. III Int. Workshop on Advances in Signal Processing for Non-Destructive Evaluation of Materials, Univ. Laval, Quebec City, August 5-8, 1997, Edited by Xavier P. V. Maldague, ASNDT Press, Vol. 3, pp. 65-71, 1998.
56. **(Invited paper)** Miller, E., Nicolaides, L., and Mandelis, A., "Nonlinear Inverse Scattering Methods for Thermal-Wave Slice Tomography", Proc. III Int. Workshop on Advances in Signal Processing for Non-Destructive Evaluation of Materials, Univ. Laval, Quebec City, August 5-8, 1997, Edited by Xavier P. V. Maldague, ASNDT Press, Vol. 3, pp. 49-55, 1998.
57. Dorojkine, L. M., Doroshenko, V. S., Mandelis, A., Rjurikov, V. F., and Rozanov, A. I., "The Novel, Based on Thermal Wave Phenomena Pyroelectric Microsensor for Detection of Hydrogen and Methane", Proceed. 11th European Conf. Solid-State Transducers, EUROSENSORS XI, Warsaw, Poland, Vol. 2, pp. 1001-1004, 1997.
58. Munidasa, M., Funak, F., and Mandelis, A., "Application of a Generalized Methodology for Quantitative Thermal Diffusivity Depth Profile Reconstruction in Manufactured Inhomogeneous Steel-Based Materials", Review of Progress in QNDE, Proceedings of the Twenty-Fourth Symposium held in San Diego, California, July 27-August 1, 1997; Edited by Donald O. Thompson and Dale E. Chimenti, Iowa State University, Ames, Plenum Press, Vol. 17A, pp. 469-476, 1998.
59. Munidasa, M., Mandelis, A., and Ball, M., "Buried Thermoelastic Layer Diagnostics by the use of Phot-Thermo-Acoustic Radiometry", Review of Progress in QNDE, Proceedings of the Twenty-Fourth Symposium held in San Diego, California, July 27-August 1, 1997; Edited by Donald O. Thompson and Dale E. Chimenti, Iowa State University, Ames, Plenum Press, Vol. 17B, pp. 1299-1306, 1998.
60. Nicolaides, L., Mandelis, A., and Munidasa, M., "Experimental and Image-Inversion Optimization Aspects of Thermal-Wave Diffraction Tomographic Microscopy", Proceed. 10th Int. Conf. Photoacoustic Photothermal Phenomena held in Rome, Italy, August 23-27, 1998; Edited by F. Scudieri and M. Bertolotti, AIP Conference Proceedings 463, pp. 8-10, 1999.
61. Munidasa, M., Mandelis, A., and Funak, F., "A Generalized Photothermal Inverse Methodology for Quantitative Thermal Diffusivity Depth Profile Reconstruction in Inhomogeneous Steels", Proceed. 10th Int. Conf. Photoacoustic Photothermal Phenomena held in Rome, Italy, August 23-27, 1998; Edited by F. Scudieri and M. Bertolotti, AIP Conference Proceedings 463, pp. 40-42, 1999.
62. Mandelis, A., Salnick, A., Opsal, J., and Rosencwaig, A., "Nonlinear Photothermal Response in 3D Geometry: A General Theoretical Model", Proceed. 10th Int. Conf. Photoacoustic Photothermal Phenomena held in Rome, Italy, August 23-27, 1998; Edited by F. Scudieri and M. Bertolotti, AIP Conference Proceedings 463, pp. 55-57, 1999.
63. Salnick, A., Chen, L., Rosencwaig, A., and Mandelis, A., "Nonlinear Fundamental Photothermal Response in 3D Geometry: Experimental Results for Tungsten", Proceed. 10th Int. Conf. Photoacoustic Photothermal Phenomena held in Rome, Italy, August 23-27, 1998; Edited by F. Scudieri and M. Bertolotti, AIP Conference Proceedings 463, pp. 61-63, 1999.
64. Wang, C., and Mandelis, A., "Purely-Thermal-Wave Interferometry using Photopyroelectric Detection", Proceed. 10th Int. Conf. Photoacoustic Photothermal Phenomena held in Rome, Italy, August 23-27, 1998; Edited by F. Scudieri and M. Bertolotti, AIP Conference Proceedings 463, pp. 138-140, 1999.
65. Mandelis, A., and Pan, G., "Thermal-Wave Resonant Cavity Measurement of the Thermodynamic Equation of State and the Pressure Dependence of Thermophysical Properties of Air", Proceed. 10th Int. Conf. Photoacoustic Photothermal Phenomena held in Rome, Italy, August 23-27, 1998; Edited by F. Scudieri and M. Bertolotti, AIP Conference Proceedings 463, pp. 300-302, 1999.
66. Mandelis, A., and Shen, J., "Kinetic Thermophysical Studies of Gasoline and Hydrocarbon Vapors using a Thermal-Wave Resonant Cavity Sensor", Proceed. 10th Int. Conf. Photoacoustic Photothermal Phenomena held in Rome, Italy,

- August 23-27, 1998; Edited by F. Scudieri and M. Bertolotti, AIP Conference Proceedings 463, pp. 389-391, 1999.
67. Garcia, J. A., Mandelis, A., Marinova, M., Michaelian, K. H., and Afrashtehfar, S., "Quantitative Photothermal Radiometric and FTIR Photoacoustic Measurements of Specialty Papers", Proceed. 10th Int. Conf. Photoacoustic Photothermal Phenomena held in Rome, Italy, August 23-27, 1998; Edited by F. Scudieri and M. Bertolotti, AIP Conference Proceedings 463, pp. 395-397, 1999.
 68. Ikari, T., Salnick, A., and Mandelis, A., "Three-Dimensional Infrared Photothermal Radiometry of Semiconductors", Proceed. 10th Int. Conf. Photoacoustic Photothermal Phenomena held in Rome, Italy, August 23-27, 1998; Edited by F. Scudieri and M. Bertolotti, AIP Conference Proceedings 463, pp. 500-502, 1999.
 69. Elek, F., Mandelis, A., and Nicolaidis, L., "Effects of the Nature of Boundary Conditions in Radial and 3-Dimensional Thermal-Wave Fields", Proceed. 10th Int. Conf. Photoacoustic Photothermal Phenomena held in Rome, Italy, August 23-27, 1998; Edited by F. Scudieri and M. Bertolotti, AIP Conference Proceedings 463, pp. 527-529, 1999.
 70. Garcia, J. A., and Mandelis, A., "Laser-Amplitude-Modulated Dual Photopyroelectric / Optical-Transmittance Hydrogen Sensor", Proceed. 10th Int. Conf. Photoacoustic Photothermal Phenomena held in Rome, Italy, August 23-27, 1998; Edited by F. Scudieri and M. Bertolotti, AIP Conference Proceedings 463, pp. 533-535, 1999.
 71. Mandelis, A., Vanniasinkam, J., and Munidasa, M., "Surface Non-Radiative Energy Generation Rates in Ti:Sapphire Laser Materials via Boxcar Time-Domain Photothermal Radiometry", Proceed. 10th Int. Conf. Photoacoustic Photothermal Phenomena held in Rome, Italy, August 23-27, 1998; Edited by F. Scudieri and M. Bertolotti, AIP Conference Proceedings 463, pp. 539-541, 1999.
 72. **(Invited Plenary)** A. Mandelis, "Diffusion-Wave Diagnostics: Emerging Quality-Control Technologies for Materials", Proc. 2nd Int. Conf. Emerging Technologies in NDT, Athens, Greece, 24-26 May 1999; Edited by D. van Hemelrijck, A. Anastassopoulos and T. Philippidis (A. A. Balkema, Rotterdam, 2000) pp. 169-177.
 73. A. Mandelis, L. Nicolaidis, Y. Chen and I. A. Vitkin, "Optical Property Determination of Turbid Media using Frequency-Domain Infrared Photothermal Radiometry", Proc. SPIE BIOS 2000 Conference, San Jose, CA, January 2000 (A. A. Oraevsky, Ed.) Vol. **3916** (2000), pp. 122-129.
 74. A. Mandelis, L. Nicolaidis, C. Feng and S. H. Abrams, "Novel Dental Depth Profilometric Imaging using Simultaneous Frequency-Domain Infrared Photothermal Radiometry and Laser Luminescence", Proc. SPIE BIOS 2000 Conference, San Jose, CA, January 2000 (A. A. Oraevsky, Ed.) Vol. **3916** (2000), pp. 130-137.
 75. Nicolaidis, L., Garcia, J., Mandelis A., and Abrams, S. H., "Dental Depth Profilometry using Simultaneous Frequency-Domain Infrared Photothermal Radiometry and Laser Luminescence for the Diagnostics of Dental Caries", Proc. SPIE BIOS 2001 Conference, San Jose, CA, January 2001, (P. Rechmann, D. Fried and T. Hennig, Eds.) Vol. **4249** (2001) pp. 79-86.
 76. J. A. Balderas-Lopez, A. Mandelis and J. A. Garcia, "Measurements of the Thermal Diffusivity of Liquids with a Thermal-Wave Resonator Cavity", Anal. Sci. (J. Japan Soc. Anal. Chem.) **17** (Special Issue), s519 – s522 (2001).
 77. A. Mandelis and C. Wang, "Technique, Application and Noise Analysis of purely Thermal-Wave Photopyroelectric Interferometry", Anal. Sci. (J. Japan Soc. Anal. Chem.) **17** (Special Issue), s5 – s8 (2001) Anal. Sci. (J. Japan Soc. Anal. Chem.) **17** (Special Issue), s447 – s450 (2001).
 78. L. Nicolaidis, A. Mandelis and C. J. Beingessner, "Depth Profilometry of Hardened Steels by Gaussian Elimination of Roughness", Anal. Sci. (J. Japan Soc. Anal. Chem.) **17** (Special Issue), s383 – s386 (2001).
 79. L. Nicolaidis, C. Feng, A. Mandelis and S. H. Abrams, "Dental Dynamic Diagnostics using Simultaneous Frequency-Domain PTR and Laser Luminescence", Anal. Sci. (J. Japan Soc. Anal. Chem.) **17** (Special Issue), s330 – s333 (2001).
 80. L. Nicolaidis, Y. Chen, A. Mandelis and I. A. Vitkin, "Analytical and Experimental Aspects of Optical Property Determination of Turbid Media using Frequency-Domain PTR", Anal. Sci. (J. Japan Soc. Anal. Chem.) **17** (Special

Issue), s326 – s329 (2001).

81. M. E. Rodriguez, A. Mandelis, F. Rabago and L. Nicolaidis, "Photothermal Characterization of B-implanted Si (Shallow) samples, Anal Sci. (J. Japan Soc. Anal. Chem.) **17** (Special Issue), s277 – s280 (2001).
82. M. E. Rodriguez, A. Mandelis, P. J. Mendoza and J. Garcia, "Photothermal Radiometric Frequency-Swept Studies of Kinetics Process in p-Si wafers", Anal Sci. (J. Japan Soc. Anal. Chem.) **17** (Special Issue), s273 – s276 (2001).
83. P. J. Mendoza, A. Mandelis, L. Nicolaidis, J. Huerta and M. E. Rodriguez, "Combined Photothermal and Photoacoustic Characterization of Silicon-Epoxy, and the existence of a Particle Percolation Threshold", Anal Sci. (J. Japan Soc. Anal. Chem.) **17** (Special Issue), s269 – s272 (2001).
84. A. Mandelis, M. E. Rodriguez, J. A. Garcia, V. Gorodokin and Y. Riopel, "Minority Carrier Lifetime and Iron Concentration Measurements on p-Si wafers by Infrared Photothermal Radiometry and Microwave Photoconductance Decay", Anal Sci. (J. Japan Soc. Anal. Chem.) **17** (Special Issue), s265 – s268 (2001).
85. M. E. Rodriguez, A. Mandelis, G. Pan, J. A. Garcia, and Y. Riopel, "Microelectronic Circuit Characterization via Photothermal Radiometry of Scribeline Recombination Lifetime", Anal Sci. (J. Japan Soc. Anal. Chem.) **17** (Special Issue), s262 – s264 (2001).
86. J. A. Garcia, L. Nicolaidis, P. Park, A. Mandelis, and B. Farahkbahsh, "Photothermal Radiometry of Thermal Sprayed Coatings: Novel Roughness Elimination Methodology", Anal Sci. (J. Japan Soc. Anal. Chem.) **17** (Special Issue), s89–s92 (2001).
87. A. Mandelis, S. Paoloni and L. Nicolaidis, "Novel Lock-in Waveform Technique for Signal-to-Noise Ratio and Dynamic Range Enhancement in Highly Noised Photothermal Experiments", Anal Sci. (J. Japan Soc. Anal. Chem.) **17** (Special Issue), s5 – s8 (2001).
88. A. Mandelis, L. Nicolaidis, Y. Chen and I. A. Vitkin, "Optical Property Determination of Turbid Media using Frequency-Domain Infrared Photothermal Radiometry", in *Biomedical Optoacoustics*, Proc. SPIE Vol. **3916**, (A. A. Oraevsky, Ed., SPIE, Bellingham, WA, 2000), pp. 122-129.
89. A. Mandelis, L. Nicolaidis, C. Feng and S. H. Abrams, "Novel Dental Depth Profilometric Imaging using simultaneous Frequency-Domain Infrared Photothermal Radiometry and Laser Luminescence", in *Biomedical Optoacoustics*, Proc. SPIE Vol. **3916**, (A. A. Oraevsky, Ed., SPIE, Bellingham, WA, 2000), pp. 130-137.
90. L. Nicolaidis, J. Garcia, A. Mandelis and S. Abrams, "Dental Depth Profilometry using simultaneous Frequency-Domain Infrared Photothermal Radiometry and Laser Luminescence for the Diagnosis of Dental Caries", accepted for publication in *Biomedical Optoacoustics*, Proc. SPIE BIOS Meeting, San Jose, CA, Jan. 20–26, 2001 (A. A. Oraevsky, Ed., SPIE, Bellingham, WA, 2001).
91. A. Mandelis, "Novel Modular Optical and Photopyroelectric Thin-Film Hydrogen Sensors based on Signal Modulation", Proc. 10th Canadian Hydrogen Conf., May 28-31 2000, Quebec City, PQ (T. K. Bose and P. Benard, Eds.), pp. 559-580 (Editor refereed)
92. A. Mandelis, "Review of progress in theoretical, experimental and computational investigations in turbid tissue phantoms and human teeth using laser infrared photothermal radiometry", Proc. SPIE Thermosense Meeting, Orlando, FL, April 1-4, 2002 Vol. **4710** (X. P. Maldague and A. E. Rozlosnik, Eds, Bellingham, WA, 2002), pp. 373 – 383.
93. R. J. Jeon, C. Han, A. Mandelis, V. Sanchez and S. H. Abrams "Dental Depth Profilometric Diagnosis of Pit & Fissure Caries using Frequency-Domain Infrared Photothermal Radiometry and Modulated Laser Luminescence", Early Detection of Caries III Proceedings of the Sixth Indiana Conference Indiana University School of Dentistry, pages 49 – 67, (G. Stookey, editor, 2003).
94. A. Mandelis, "Photo-carrier radiometry of semiconductors: a novel optoelectronic diffusion-wave technique for silicon process NDT", Proc. 3rd Int. Conf. On Emerging Technologies in NDT, 26-28 May 2003, Thessaloniki, Greece; (D. van Hemelrijk, A. Anastasopoulos and N. E. Melanitis, Eds. A.A. Balkema Publ. Lisse, 2004), pp. 9 – 17.

95. E. L. Miller and A. Mandelis, "On imaging multiple physical parameters in an inverse problems context", Proc. SPIE Vol. **5299**, Computational Imaging II (C. A. Bouman and E. L. Miller, Eds., Bellingham WA 2004), pp. 51 – 62.
96. A. Mandelis, "Laser Photo-Carrier Radiometry: Technique and Applications to Semiconductor Fabrication Process NDE", Invited Proceedings paper, submitted 16th World Conference on Nondestructive Testing, held August 30 – Sept. 3, 2004 in Montreal.
97. Y. Liu, A. Mandelis and N. Baddour, "Transverse Depth-Profilometric Hardness Photothermal Phase Imaging of Heat Treated Steels", Proceedings paper, submitted 16th World Conference on Nondestructive Testing, held August 30 – Sept. 3, 2004 in Montreal.
98. A. Bendada, N. Baddour, A. Mandelis and C. Moreau, "Investigation on the Accuracy of Thermal-Wave Interferometry in the Thermophysical Characterization of Coatings", Proceedings paper, submitted 16th World Conference on Nondestructive Testing, held August 30 – Sept. 3, 2004 in Montreal.
99. **(Invited)** Y. Fan, A. Mandelis, G. Spirou, I. A. Vitkin and W. Whelan, "Three-dimensional photothermoacoustic depth profilometric imaging by use of linear frequency sweep heterodyne method", SPIE Vol. **5320**, Photons plus Ultrasound: Imaging and Sensing (A. A. Oraevsky and L. V. Wang, Eds., Bellingham WA 2004), pp. 113 – 127.
100. R. Jeon, A. Mandelis and S. Abrams, "Dental depth profilometric diagnosis of pit and fissure caries using frequency-domain infrared photothermal radiometry and modulated luminescence", SPIE Vol. **5320**, Photons plus Ultrasound: Imaging and Sensing (A. A. Oraevsky and L. V. Wang, Eds., Bellingham WA 2004), pp. 29 - 39.
101. D. Shaughnessy, B. Li, A. Mandelis, J. Batista and J. Tolev, "Photocarrier Radiometry of Ion Implanted Semiconductors", paper 06P-22, Proc. 13th Int. Conf. Photoacoustic & Photothermal Phenomena, July 5 – 8, 2004, J. Physique IV France, **125**, 447 – 449 (2005).
102. D. Shaughnessy, A. Mandelis and J. Batista, "Contamination Monitoring of Si Wafers using Photocarrier Radiometry", paper 10P-03, Proc. 13th Int. Conf. Photoacoustic & Photothermal Phenomena, July 5 – 8, 2004, J. Physique IV France, **125**, 561 – 563 (2005).
103. **(Invited)** A. Mandelis, "Photo-Carrier Radiometry of Electronic Solids: A Powerful New Optoelectronic Carrier-Diffusion –Density Wave Methodology", paper 10L-01, Proc. 13th Int. Conf. Photoacoustic & Photothermal Phenomena, July 5 – 8, 2004, J. Physique IV France, **125**, 545 – 550 (2005).
104. A. Matvienko and A. Mandelis, "Measurements of Thermal Diffusivity of Water-Alcohol Mixtures using a Thermal-Wave Resonator Cavity", paper 03P-40, Proc. 13th Int. Conf. Photoacoustic & Photothermal Phenomena, July 5 – 8, 2004, J. Physique IV France, **125**, 269 – 271 (2005).
105. X. Guo, J. A. Garcia, A. Mandelis and A. Simmons, "Photo-Carrier Radiometry (PCR) Metrology for Semiconductor Manufacturing Inspection", paper 12O-06, Proc. 13th Int. Conf. Photoacoustic & Photothermal Phenomena, July 5 – 8, 2004, J. Physique IV France, **125**, 639 - 641 (2005).
106. J. Batista, A. Mandelis, D. Shaughnessy and B. Li, "Infrared Photocarrier Radiometry with dc Sub-Bandgap Optical Bias: Sensitivity Enhancement in the Detection of Deep Subsurface Electronic Defects in Si Wafers", paper 10O-03, Proc. 13th Int. Conf. Photoacoustic & Photothermal Phenomena, July 5 – 8, 2004, J. Physique IV France, **125**, 557 – 559 (2005).
107. A. Mandelis, J. Batista, M. Pawlak, J. Gibkes and J. Pelzl, "Space Charge Layer Dynamics at Oxide-Semiconductor Interfaces under Optical Modulation: Theory and Experimental Studies by Non-Contact Photocarrier Radiometry", paper 10P-04, Proc. 13th Int. Conf. Photoacoustic & Photothermal Phenomena, July 5 – 8, 2004, J. Physique IV France, **125**, 565 – 567 (2005).
108. Y. Liu, M. Choy, A. Mandelis, J. Batista and B. Li, "Laser Thermoreflectance Temperature Measurements of Metal Coating Alloys on a Rotating Platform", paper 11P-07, Proc. 13th Int. Conf. Photoacoustic & Photothermal Phenomena, July 5 – 8, 2004, J. Physique IV France, **125**, 601 – 604 (2005).

109. J. Batista, A. Mandelis, and D. Shaughnessy, "Laser-based measurements of temperature dependence of carrier mobility and lifetime in Si wafers using photocarrier radiometry", Proc. 13th Int. Conf. Photoacoustic & Photothermal Phenomena, July 5 – 8, 2004, J. Physique IV France, **125**, 443 - 445 (2005).
110. Y. Liu, N. Baddour, A. Mandelis and C. Wang, "Inspection of an end quenched plain steel Jominy bar with photothermal radiometric techniques", Proc. 13th Int. Conf. Photoacoustic & Photothermal Phenomena, July 5 – 8, 2004, J. Physique IV France, **125**, 523 – 526 (2005).
111. C. Wang, A. Mandelis and Y. Liu, "Non-destructive evaluation of cylindrical composite structures using photothermal radiometry", Proc. 13th Int. Conf. Photoacoustic & Photothermal Phenomena, July 5 – 8, 2004, J. Physique IV France, **125**, 605 - 608 (2005).
112. C. Wang, A. Mandelis and Y. Liu, "Theory and experiments of photothermal radiometry with solid cylinder samples", Proc. 13th Int. Conf. Photoacoustic & Photothermal Phenomena, July 5 – 8, 2004, J. Physique IV France, **125**, 609 - 612 (2005).
113. A. Mandelis, Y. Fan, G. Spirou and A. Vitkin, "Development of a photothermoacoustic frequency swept system: Theory and experiment", Proc. 13th Int. Conf. Photoacoustic & Photothermal Phenomena, July 5 – 8, 2004, J. Physique IV France, **125**, 643 - 647 (2005).
114. R. J. Jeon, T. D. T. Phan, A. Wu, G. Kulkarni, S. H. Abrams and A. Mandelis, "Photothermal radiometric quantitative detection of the different degrees of demineralization of dental enamel by acid etching", Proc. 13th Int. Conf. Photoacoustic & Photothermal Phenomena, July 5 – 8, 2004, J. Physique IV France, **125**, 721 - 723 (2005).
115. R. J. Jeon, A. Mandelis, V. Sanchez and S. H Abrams, "Dental depth profilometric diagnosis of pit & fissure caries using frequency-domain infrared photothermal radiometry and modulated laser luminescence", Proc. 13th Int. Conf. Photoacoustic & Photothermal Phenomena, July 5 – 8, 2004, J. Physique IV France, **125**, 741 - 744 (2005).
116. **(Keynote Paper)** A. Mandelis, R. J. Jeon, S. Telenkov, Y. Fan and A. Matvienko, "Trends in Biothermophotonics and Bioacoustophotonics of Tissues", 30 Aug. – 2 Sept. 2005, Warsaw, Poland. Proc. SPIE Conf. on Optics and Optoelectronics, Vol. **5953** Acousto-optics and Photoacoustics (A. Sliwinski, R. Reibold and V. B. Voloshinov, Eds., Bellingham, WA, 2005), pp. 1 - 15.
117. R. J. Jeon, C. Han, A. Mandelis, V. Sanchez, and S.H. Abrams, "DentalDepth Profilometric Diagnosis of Pit & Fissure Caries usingFrequency-Domain Infrared Photothermal Radiometry and Modulated Laser Luminescence", Early Detection of Caries III Proceedings of the Sixth Indiana Conference Indiana University School of Dentistry May 2003, Stookey,G., editor, 2005.
118. R. Jeon, A. Mandelis, V. Sanchez, and S. H. Abrams, "Dental Depth Profilometric Diagnosis of Pit & Fissure Caries using Frequency-Domain Infrared Photothermal Radiometry and Modulated Laser Luminescence", SPIE Meeting BIOS 2004, January Poster Proceedings.
119. K. R. Leong, A. Mandelis, N. P. Kherani and S. Zukotynski, "Photocarrier Radiometric Lifetime Measurements of Intrinsic Amorphous-Crystalline Silicon Heterostructure", MRS Symp. Proc. Vol. **910**, A06-03 (1 – 6) (2006).
120. **(Invited Paper)** A. Mandelis, "Bioacoustophotonic Depth-Selective Imaging of Turbid Media and Tissues: Instrumentation and Measurements": WSEAS Conf. Proc. Paper 537-284. Elounda, Crete, Greece, Aug. 2006.
121. **(Invited Paper)** A. Mandelis, R. Jeon, A. Matvienko, S. H. Abrams and B. T. Amaechi, "Dental Biothermophotonics: How Photothermal Methods are Winning the Race with X-Rays for Dental Caries Diagnostic Needs of Clinical Dentistry", Proc. 14th Int. Conf. Photoacoustic & Photothermal Phenomena, January 6 – 9, 2007, European Physical Journal, Special Topics **153**, 449 – 454 (2008).
122. A. Matvienko, J. Jeon, A. Mandelis, G. Arvizu, A. Esteban Gomez, S. H. Abrams, and B. T. Amaechi, "Dental Biothermophotonics: A Quantitative Photothermal Analysis of Early Dental Demineralization", Proc. 14th Int. Conf.

- Photoacoustic & Photothermal Phenomena, January 6 – 9, 2007, European Physical Journal, Special Topics **153**, 463 – 465 (2008).
123. A. Matvienko and A. Mandelis, “Theoretical Analysis of PPE Measurements in Liquids using a Thermal-Wave Cavity”, Proc. 14th Int. Conf. Photoacoustic & Photothermal Phenomena, January 6 – 9, 2007, European Physical Journal, Special Topics **153**, 127 – 129 (2008).
124. C. H. Kwan, A. Matvienko and A. Mandelis, “Dimensionality Considerations of Thermal Transport Mechanisms in a Thermal-Wave Cavity”, Proc. 14th Int. Conf. Photoacoustic & Photothermal Phenomena, January 6 – 9, 2007, European Physical Journal, Special Topics **153**, 131 – 134 (2008).
125. A. Matvienko, J. Jeon, A. Mandelis, G. Arvizu, A. E. Gomez, S. H. Abrams and B. T. Amaechi, “Dental biothermophotonics: A quantitative photothermal analysis of early dental demineralization”, Proc. 14th Int. Conf. Photoacoustic & Photothermal Phenomena, January 6 – 9, 2007, European Physical Journal, Special Topics **153**, 463 – 465 (2008).
126. R. J. Jeon, A. Matvienko, A. Mandelis, S. H. Abrams, B. T. Amaechi, and G. Kulkarni, “Interproximal Dental Caries Detection using Photothermal Radiometry (PTR) and Modulated Luminescence (LUM)”, Proc. 14th Int. Conf. Photoacoustic & Photothermal Phenomena, January 6 – 9, 2007, European Physical Journal, Special Topics **153**, 467 – 469 (2008).
127. J. Xia and A. Mandelis, “Noncontact Deep Level Photo-Thermal Spectroscopy of Semi-insulating GaAs”, Proc. 14th Int. Conf. Photoacoustic & Photothermal Phenomena, January 6 – 9, 2007, European Physical Journal, Special Topics **153**, 283 – 285 (2008).
128. J. A. Garcia, X. Guo, A. Mandelis, D. Shaughnessy, L. Nicolaidis, and A. Salnick, “Characterization of Nano-Depth Junctions in Silicon by Using Photo-Carrier Radiometry (PCR)”, Proc. 14th Int. Conf. Photoacoustic & Photothermal Phenomena, January 6 – 9, 2007, European Physical Journal, Special Topics **153**, 287 – 290 (2008).
129. A. Mandelis and J. Tolev, “Free Carrier Modulation of a Sub-bandgap CW Laser Beam: A Si Optoelectronic Chopper”, Proc. 14th Int. Conf. Photoacoustic & Photothermal Phenomena, January 6 – 9, 2007, European Physical Journal, Special Topics **153**, 387 – 390 (2008).
130. **(Invited Paper)** S. A. Telenkov and A. Mandelis, “Fourier-domain methodology for depth-selective photothermoacoustic imaging of tissue chromophores”, Proc. 14th Int. Conf. Photoacoustic & Photothermal Phenomena, January 6 – 9, 2007, European Physical Journal, Special Topics **153**, 443 – 448 (2008).
131. C. Wang and A. Mandelis, “Evaluation of effective case depth in heat treated steel products using photothermal radiometry”, Proc. 14th Int. Conf. Photoacoustic & Photothermal Phenomena, January 6 – 9, 2007, European Physical Journal, Special Topics **153**, 373 – 376 (2008).
132. C. Wang, Y. Liu, A. Mandelis and J. Shen, “Photothermal Radiometry with Spherical Solids”, Proc. 14th Int. Conf. Photoacoustic & Photothermal Phenomena, January 6 – 9, 2007, European Physical Journal, Special Topics **153**, 415 – 418 (2008).
133. C. Wang, A. Mandelis and Y. Liu, “Effect of laser beam size on measurement contrast of thermophysical gradients in layered structures using thermal-wave techniques”, Proc. 14th Int. Conf. Photoacoustic & Photothermal Phenomena, January 6 – 9, 2007, European Physical Journal, Special Topics **153**, 95 – 98 (2008).
134. C. Wang, A. Mandelis, J. Tolev and J. Meijer, “Photocarrier Radiometric Characterization of Electronic Transport Properties of High-Energy H⁺ Implanted Silicon Wafers”, Proc. 14th Int. Conf. Photoacoustic & Photothermal Phenomena, January 6 – 9, 2007, European Physical Journal, Special Topics **153**, 271 – 274 (2008).
135. C. Wang and A. Mandelis, “Characterization of hardened cylindrical samples using photothermal radiometry”, Proc. 14th Int. Conf. Photoacoustic & Photothermal Phenomena, January 6 – 9, 2007, European Physical Journal, Special Topics **153**, 123 – 126 (2008).

136. J. Tolev, A. Mandelis and M. Pawlak, "On the Non-linear Dependence of Photocarrier Radiometry Signals from Si Wafers on the Intensity of the Laser Beam", Proc. 14th Int. Conf. Photoacoustic & Photothermal Phenomena, January 6 – 9, 2007, European Physical Journal, Special Topics **153**, 317 – 320 (2008).
137. Y. Liu and A. Mandelis, "Real-time Remote Temperature and Thickness Measurement of Titanium Nitride Thin Coatings Growing on Steel Using Laser Thermoreflectance Optical thermometer", Proc. 14th Int. Conf. Photoacoustic & Photothermal Phenomena, January 6 – 9, 2007, European Physical Journal, Special Topics **153**, 405 – 408 (2008).
138. J. Tolev and A. Mandelis, "Investigation of H⁺ Implanted Silicon Wafers with Two-beam Cross-modulation Photocarrier Radiometry", Proc. 14th Int. Conf. Photoacoustic & Photothermal Phenomena, January 6 – 9, 2007, European Physical Journal, Special Topics **153**, 295 – 297 (2008).
139. G. M. Spirou, A. Mandelis, I. A. Vitkin, and W. M. Whelan, "A calibration technique for frequency-domain photothermoacoustics", Proc. 14th Int. Conf. Photoacoustic & Photothermal Phenomena, January 6 – 9, 2007, European Physical Journal, Special Topics **153**, 491 – 495 (2008).
140. **(Invited Paper)** J. Xia and A. Mandelis, "Deep-Level Photo-Thermal Spectroscopy", "Emerging Technologies in NDT", Proc. 4th Int. Conf. On Emerging Technologies in NDT 2 – 4 April 2007, Stuttgart, Germany (G. Busse, D. Van Hemelrijk, I. Solodov and A. Anastasopoulos, Eds., Taylor & Francis, New York); pp. 187 – 192 (2008).
141. A. Mandelis, J. A. Garcia and C-H. Wang, "Non-contact case depth monitoring of industrial hardened parts using laser infrared photothermal radiometry", "Emerging Technologies in NDT", Proc. 4th Int. Conf. On Emerging Technologies in NDT 2 – 4 April 2007, Stuttgart, Germany (G. Busse, D. Van Hemelrijk, I. Solodov and A. Anastasopoulos, Eds., Taylor & Francis, New York); pp. 205 – 209 (2008).
142. A. Matvienko, R. J. Jeon, A. Mandelis, S. H. Abrams and B. T. Amaechi, "Photothermal Detection of Incipient Dental Caries: Experiment and Modeling", Photonics East, Proc. SPIE Vol. **6759** (Paper Number: 6759-19 (1-10)) "Smart Biomedical and Physiological Sensor Technology V" (B. M. Cullum and D. M. Porterfield, Eds.) (2007).
143. A. Mandelis, A. Matvienko and S. H. Abrams, "Theoretical Analysis of Dental Demineralization using Photothermal Radiometry", (SPIE BIOS, San Jose, USA, January 2008), Proc. SPIE Vol. **6856**, 68560W-1 – 9 (2008).
144. R. J. Jeon, A. Hellen, A. Matvienko, A. Mandelis, S. H. Abrams and B. T. Amaechi, "Experimental Investigation of Demineralization and Remineralization of Human Teeth Using Infrared Photothermal Radiometry and Modulated Luminescence", (SPIE BIOS, San Jose, USA, January 2008), Proc. SPIE Vol. **6856**, 68560B - 1 – 10 (2008).
145. C. H. Kwan, A. Matvienko and A. Mandelis, "Non-Invasive Detection of Osteoporotic Bone Loss using Photothermal Radiometry and Modulated Luminescence", (SPIE BIOS, San Jose, USA, January 2008), Proc. SPIE Vol. **6856**, 685625-1 – 9 (2008). (2008).
146. A. Mandelis, C-H. Kwan and A. Matvienko, "Dynamic Photophysical Processes in Laser Irradiated Human Cortical Skull Bone Measured by Means of Modulated Luminescence", (SPIE BIOS, San Jose, USA, January 2009), Proc. SPIE Vol. **7166** (10), 71660A1 – 12 (April 2009).
147. A. Matvienko, A. Mandelis, A. Hellen, R. Jeon, S. Abrams and B. Amaechi, "Quantitative Analysis of Incipient Mineral Loss in Hard Tissues", (SPIE BIOS, San Jose, USA, January 2009), Proc. SPIE BIOS Vol. **7166** (12), 71660C1 – 12 (April 2009).
148. H. Qu, C. Wang, X. Guo, and A. Mandelis, "Hardness depth profiling of case hardened steels using a three-dimensional photothermal technique", Proc. 15 Int. Conf. Photoacoustic Photothermal Phenomena (15 ICPPP), July 19 – 23, 2009, Leuven, Belgium, *J. Phys. Conf. Ser.* **214** 012087 (1 – 5) (2010).

149. G. Xie, Z. Chen, C. Wang, A. Mandelis and X. Yuan, "Photothermal characterization of solid two-layer spherical structures", Proc. 15 Int. Conf. Photoacoustic Photothermal Phenomena (15 ICPPP), July 19 – 23, 2009, Leuven, Belgium, *J. Phys. Conf. Ser.* **214** 012074 (1 – 5) (2010).
150. Jun Xia and Andreas Mandelis, "Photocarrier radiometric study of defect states in semiinsulating GaAs", Proc. 15 Int. Conf. Photoacoustic Photothermal Phenomena (15 ICPPP), July 19 – 23, 2009, Leuven, Belgium, *J. Phys. Conf. Ser.* **214** 012107 (1 – 5) (2010).
151. **(Invited)** Andreas Mandelis and Jun Xia, "Broadening effects and ergodicity in deep level photo-thermal spectroscopy of defect states in semi-insulating GaAs: a combined temperature-, pulse-rate- and time-domain study of defect state kinetics", Proc. 15 Int. Conf. Photoacoustic Photothermal Phenomena (15 ICPPP), July 19 – 23, 2009, Leuven, Belgium, *J. Phys. Conf. Ser.* **214** 012001 (1 – 7) (2010).
152. A. Melnikov, A. Mandelis, J. Tolev and E. Lioudakis, "Infrared photocarrier radiometry, modulated photovoltage and electrical characteristics of polycrystalline Si solar cells", Proc. 15 Int. Conf. Photoacoustic Photothermal Phenomena (15-ICPPP), July 19 – 23, 2009, Leuven, Belgium, *J. Phys. Conf. Ser.* **214** 012111 (1 – 5) (2010).
153. X. Guo, A. Mandelis, A. Matvienko, K. Sivagurunathan and B. Zinman, "Wavelength-modulated differential laser photothermal radiometry for blood glucose measurements", Proc. 15 Int. Conf. Photoacoustic Photothermal Phenomena (15-ICPPP), July 19 – 23, 2009, Leuven, Belgium, *J. Phys. Conf. Ser.* **214** 012025 (1 – 4) (2010).
154. X. Guo, K. Sivagurunathan, M. Pawlak, J. Garcia, A. Mandelis, S. Giunta, S. Milletari and S. Bawa, "Laser photothermal radiometric instrument for industrial steel hardness inspection ", Proc. 15 Int. Conf. Photoacoustic Photothermal Phenomena (15-ICPPP), July 19 – 23, 2009, Leuven, Belgium, *J. Phys. Conf. Ser.* **214** 012080 (1 – 5) (2010).
155. N. Tabatabaei and A. Mandelis, "Thermal-wave radar", Proc. 15 Int. Conf. Photoacoustic Photothermal Phenomena (15-ICPPP), July 19 – 23, 2009, Leuven, Belgium, *J. Phys. Conf. Ser.* **214** 012088 (1 – 5) (2010).
156. P. Martínez-Torres, A. Mandelis and J. J. Alvarado-Gil, "Photothermal radiometric determination of thermal diffusivity depth profiles in a dental resin", Proc. 15 Int. Conf. Photoacoustic Photothermal Phenomena (15-ICPPP), July 19 – 23, 2009, Leuven, Belgium, *J. Phys. Conf. Ser.* **214** 012097 (1 – 4) (2010).
157. J. Tolev and A. Mandelis, "Laser photothermal non-destructive metrology of cracks in un-sintered powder metallurgy manufactured automotive transmission sprockets", Proc. 15 Int. Conf. Photoacoustic Photothermal Phenomena (15-ICPPP), July 19 – 23, 2009, Leuven, Belgium, *J. Phys. Conf. Ser.* **214** 012076 (1 – 5) (2010).
158. R. J. Jeon, K. Sivagurunathan, J. Garcia, A. Matvienko, A. Mandelis, and S. Abrams, "Dental Diagnostic Clinical Instrument ("Canary") Development Using Photothermal Radiometry and Modulated Luminescence", Proc. 15 Int. Conf. Photoacoustic Photothermal Phenomena (15-ICPPP), July 19 – 23, 2009, Leuven, Belgium, *J. Phys. Conf. Ser.* **214** 012023 (1 – 4) (2010).
159. B. Lashkari and A. Mandelis, "Frequency-Domain photothermoacoustic imaging contrast enhancement with a CW laser and non-linear frequency modulation chirps", Proc. 15 Int. Conf. Photoacoustic Photothermal Phenomena (15-ICPPP), July 19 – 23, 2009, Leuven, Belgium, *J. Phys. Conf. Ser.* **214** 012061 (1 – 5) (2010).
160. A. Hellen, A. Mandelis, and Y. Finer, "Photothermal Radiometry and Modulated Luminescence Examination of Demineralized and Remineralized Lesions", Proc. 15 Int. Conf. Photoacoustic Photothermal Phenomena (15-ICPPP), July 19 – 23, 2009, Leuven, Belgium, *J. Phys. Conf. Ser.* **214** 012024 (1 – 5) (2010).
161. **(Invited)** A. Hellen, A. Mandelis, Y. Finer and B. Amaechi, "Quantitative examination of demineralized and remineralized dental lesions using photothermal radiometry and modulated luminescence ", SPIE BiOS Proc. SPIE **7548**, 75484G (2010).
162. **(Plenary invited)** A. Mandelis, "Infrared Lock-in Carrierography (Photocarrier Radiometric Imaging) of Semiconductors and Si Solar Cells", Paper # 163, Proc. 10th Int. Conf. on Quantitative InfraRed Thermography,

July 27 – 30, 2010, Quebec City, Canada.

163. R. Celorrio, E. Apiñaniz, A. Mendioroz, A. Salazar and A. Mandelis, “Improved algorithm to reconstruct the thermal conductivity depth profile in hardened steels”, Paper # 032, Proc. 10th Int. Conf. on Quantitative InfraRed Thermography, July 27 – 30, 2010, Quebec City, Canada.
164. X. Guo, A. Mandelis, A. Matvienko, K. Sivagurunathan, and B. Zinman, “Wavelength-modulated differential photothermal radiometry for non-Invasive blood glucose detection”, Paper # 052, Proc. 10th Int. Conf. on Quantitative InfraRed Thermography, July 27 – 30, 2010, Quebec City, Canada.
165. A. Hellen, A. Mandelis, Y. Finer and B. T. Amaechi, “Real-time monitoring of dental lesions using transmission-mode photothermal radiometry and modulated luminescence”, Paper # 053, Proc. 10th Int. Conf. on Quantitative InfraRed Thermography, July 27 – 30, 2010, Quebec City, Canada.
166. B. Lashkari and A. Mandelis, “Contrast comparison between frequency- and time-domain photoacoustic imaging”, Paper # 072, Proc. 10th Int. Conf. on Quantitative InfraRed Thermography, July 27 – 30, 2010, Quebec City, Canada.
167. A. Mandelis and J. Tolev, “Free carrier diffusion-wave modulation of a sub-bandgap cw laser beam”, Paper # 082, Proc. 10th Int. Conf. on Quantitative InfraRed Thermography, July 27 – 30, 2010, Quebec City, Canada.
168. A. Matvienko, A. Mandelis, A. Hellen, R. Jeon, S. H. Abrams and B. T. Amaechi, “Quantitative analysis of dental tissue properties using photothermal radiometry”, Paper # 085, Proc. 10th Int. Conf. on Quantitative InfraRed Thermography, July 27 – 30, 2010, Quebec City, Canada.
169. N. Tabatabaei, A. Mandelis, and B.T. Amaechi, “Thermophotonic lock-in imaging: An active thermography system for detecting early carious lesions in human teeth”, Paper # 134, Proc. 10th Int. Conf. on Quantitative InfraRed Thermography, July 27 – 30, 2010, Quebec City, Canada.
170. S. Telenkov and A. Mandelis, “Dual-Mode Photoacoustic Phased-Array Imager for Biomedical Applications”, Paper # 136, Proc. 10th Int. Conf. on Quantitative InfraRed Thermography, July 27 – 30, 2010, Quebec City, Canada.
171. A. Hellen, A. Mandelis, Y. Finer and B. Amaechi, “Quantitative Examination of Demineralized and Remineralized Dental Lesions Using Photothermal Radiometry and Modulated Luminescence”, Proc. SPIE Society of Photo-Optical Instrumentation Engineering, “Photonic Therapeutics and Diagnostics VI”, 23 – 25 Jan. 2010, San Francisco, CA, USA, Vol. 7548, pp. 75484G 1 – 6 (SPIE Press, April 2010)
172. S. Telenkov and A. Mandelis, “Photoacoustic Sonar: Principles of operation, imaging and signal-to-noise analysis in time and frequency domains”, Proc. SPIE Society of Photo-Optical Instrumentation Engineering Conf. 7899 (“Photons plus Ultrasound: Imaging and Sensing 2011”), 23-25 Jan. 2011, San Francisco, CA, USA, Vol. 7899, pp. 78990Y 1 – 9 (SPIE Press, April 2011).
173. A. Hellen, A. Mandelis, Y. Finer and B. T. Amaechi, “Quantitative Evaluation of Simulated Human Enamel Caries Kinetics using Photothermal Radiometry and Modulated Luminescence”, Proc. SPIE Society of Photo-Optical Instrumentation Engineering Conf. 7883 (“Therapeutics and Diagnostics VII”), 23-25 Jan. 2011, San Francisco, CA, USA, Vol. 7883, pp. 78834M1 1 – 14
174. B. Lashkari and A. Mandelis, “Time- and frequency-domain biomedical photoacoustic imaging: A comparative study”, Proc. SPIE Society of Photo-Optical Instrumentation Engineering Conf. 7883 (“Therapeutics and Diagnostics VII”), 23-25 Jan. 2011, San Francisco, CA, USA, Vol. 7883, pp. 78834R1 1 – 15 (SPIE Press, February 2011).

IV (a). TECHNICAL POPULARIZED PUBLICATIONS

1. A. Mandelis, “Photothermal Rate-Window Instrumentation and Measurements in Industrial Opto-Electronic Materials”, *Laser und Optoelektronik* **26** (2), April 1994, pp. 66.

2. A. Mandelis, "Luminescence, IR Imaging find cracks in teeth", Biophotonics International, November 2000, 22-23.
3. A. Mandelis, "New Tools May Lessen Time in Dentist's Chair", Photonics Spectra, November 2000, 50-51.
4. A. Mandelis, "Photothermal Diagnostic Technologies Go Where No Light Has Gone Before", Optics and Photonics News (OPN; published by the Optical Society of America), June 2002 issue.

IV(b). ARTICLES IN POPULARIZED SCIENCE MAGAZINES, TV COVERAGE AND PAPERS WRITTEN ABOUT A. MANDELIS' RESEARCH

1. "Future Tech: Dentistry by Laser Light. Laser beams make a play to replace the scalpel, the dental drill, and the X ray", feature article by Diane Martindale, Discover Magazine, Vol. 23, No. 6, June 2002, pp. 24-25.
2. Tyler Hamilton (Toronto Star), "Quantum Detection of Tooth Decay: A new laser device designed to detect the earliest stages of tooth decay could help dentists stop cavities in their tracks", MIT Technology Review, Friday March 23 (2007). On-line article at: <http://www.technologyreview.com/Biotech/18426/>
3. Randy Atkins, Senior Media Relations Officer, National Academy of Engineering (www.nae.edu) The National Academies, "Tooth Decay Detector: A new technology may soon allow you to avoid x-rays at the dental office. It could spot cavities earlier too", Interview aired on WTOP radio series on Engineering, April 14 and 15, 2007, Washington D.C. 103.5 FM; www.nae.edu/radio
4. "Technology advances oral care", The Globe and Mail, Monday April 2, 2007.
5. Tyler Hamilton, "A Quantum leap for treating tooth decay: Local dentistry start-up develops laser prototype to better detect cavities", The Toronto Star, Business Section, July 2 (2007).
6. "New Dental Technology May Help Replace The Dreaded Drill", Monday July 14, 2008. CityTV, Toronto, http://video.citynews.ca/index.jsp?auto_band=x&f=sv&fr_story=176b9c3cce63cb8f27714b78225d19fa0bb874b4 or: http://www.citynews.ca/news/news_24743.aspx (Coverage of Photothermal Radiometry and Modulated Luminescence (PTR/LUM) based "Canary dental caries detection system" developed at the CADIFT, UofT)
7. "New dental practice aimed at minimizing dental procedures", Sunday July 3, 2008. CTV, Toronto, <http://watch.ctv.ca/news/health/lifetime-with-monica-matys/#clip64385> (Coverage of Photothermal Radiometry and Modulated Luminescence (PTR/LUM) based "Canary dental caries detection system" developed at the CADIFT, UofT)
8. "Breakthrough Technology may Revolutionize Tooth Decay Treatment", FDA News, Device Daily Bulletin, July 7, 2008 <http://fdanews.com/newsletter/article?issueld=11739&articleld=108258> (Coverage of Photothermal Radiometry and Modulated Luminescence (PTR/LUM) based "Canary dental caries detection system" developed at the CADIFT, UofT)
9. "New technology to affect treatment of tooth decay", Dental Economics, July 3, 2008, http://www.dentaleconomics.com/display_article/333523/54/none/none/DEPnw/New-technology-to-affect-treatment-of-tooth-decay (Coverage of Photothermal Radiometry and Modulated Luminescence (PTR/LUM) based "Canary dental caries detection system" developed at the CADIFT, UofT)
10. "Groundbreaking dental device will prevent cavities", Niagara Falls (ON) Review, 15/05/2009, p. H5 (Coverage of PTR/LUM dental caries technology).
11. "Quantum Dental Technologies Canary System Claims Top Perch. First Canadian company to win international medical device design and development award.", The Health Technology Exchange, Toronto, ON, August 24, 2010 (Coverage of PTR/LUM dental caries instrumentation technology: The Canary System).

12. "QDT's Canary System wins International Medical Device Design and Development award", Dental Tribune (The World's Dental Newspaper), Aug. 27, 2010.
13. "Fighting Tooth Decay. A new way of peering inside teeth.", Leading Edge article, UofT Magazine, Summer 2011, pp. 17-18.
14. "**Sweet beams: Lasers to measure blood sugar:** Technique shows early promise in gauging diabetics' glucose levels", Science News, Web edition: Thursday Sept. 29, 2011, <http://www.sciencenews.org>. Article by Devin Powell.
15. "Non-invasive blood glucose monitoring", Diabetes Forum.com, October 3, 2011.
16. "Lasers used to measure blood sugar levels", Nerditorial, October 8, 2011.
17. "Sweet beams: Lasers to magnitude blood sugar", Technology Information, October 2, 2011.
18. "Cavity Catchers", Reader's Digest February 2012, p. 26. Article by Chantal Braganza on our dental caries diagnostic imaging research with the "photothermal imaging radar".

V. PRESENTATIONS

V.1. INVITED, PLENARY AND KEYNOTE PRESENTATIONS

Lifetime Invited, Plenary and Keynote presentations to-date:

154

1. Invited seminars on "Photothermal Wave Sciences: An Overview", Department of Physics and Mathematics, University of Crete; and Research Center of Crete: Institute of Electronic Structure and Laser; Heraklion, Crete, Greece; August 20-22, 1984.
2. Eastman Kodak Company, Analytical Sciences Division Labs, Rochester, New York; February 20, 1986; "Photothermal Deflection Spectroscopy (PDS) and Its Applications to the Optical and Optoelectronic Characterization of Semiconductors".
3. "Fundamental Theoretical Aspects of Thermal Wave Physics", Review of Progress in Quantitative NDE, August 3-8, 1986; University of California, San Diego. Paper Tu. VIII.4
4. "Inspection in the Semiconductor Industry", Meeting on Industrial Inspection; B.C. Research Council, Vancouver, June 25-26, 1987.
5. "Frequency Modulation Time Delay Photopyroelectric Spectrometry", 5th International Topical Meeting on Photoacoustic and Photothermal Phenomena, July 27-30, 1987; Heidelberg F.D.R. Paper ThA1.
6. "Photopyroelectric Spectroscopic (P²ES) QNDE of a-Si:H Thin Semiconducting Films on Quartz", Review of Progress in Quantitative NDE, July 31-August 5, 1988; University of California, San Diego, Paper XXX.2.
7. "Frequency-Modulated (FM) Time-Delay-Domain Photothermal Spectrometry: Principles, Instrumentation and Applications to Solids", Heraeus Foundation Conference on Photoacoustic, Photothermal and Photochemical Processes in Gases and at Surfaces and Thin Films, Bad Honnef, FRG, November 21-24, 1988.
8. "Laplace Thermal-Wave Physics: A New Theory of Photothermal Wave Diffraction and Interference in Condensed Media", Lasers '88; Lake Tahoe, NV, U.S.A., December 5-9, 1988.
9. "Photopyroelectric Imaging Instrumentation and Spatially Resolved Measurements", American Physical Society

Meeting, March 20-24, 1989, St. Louis, MO., paper I5.3 (Presented by M. Mieszkowski).

10. "Laser-photothermal Wave Diffraction and Interference in Condensed Media: Theory and Experiment", ETH Zurich, Laser Seminar Series, January 16, 1989.
11. "Semiquantitative Analysis of the Kinetic Mechanism of Hydrogen Detection by a Palladium-Coated Photopyroelectric Detector", Sixteenth Annual Meeting of the Federation of Analytical Chemistry and Spectroscopy Societies, FACSS XVI, Chicago, IL, Paper #816, October 1-6, 1989.
12. "Impulse Response Photothermal Instrumentation and Applications", American Physical Society Meeting, March 12-16, 1990, Anaheim, CA, Paper I4-4 (Presented by S. Peralta).
13. Series of Research Seminars titled "Photoacoustic and Photothermal Spectroscopy and Detection in Condensed Phases. Part I", Dept. of Physics, Katholieke Universiteit Leuven, Belgium; March 28-April 13, 1990.
14. "Photothermal-Wave Diffraction and Interference in Condensed Media; Theoretical Formulation and Experimental Evidence in Aluminum", Department of Physics, Royal Military College of Canada, Kingston, Ontario, February 8, 1990.
15. Series of Research Seminars titled "Photoacoustic and Photothermal Spectroscopy and Detection in Condensed Phases. Part II", Dept. of Physics, Katholieke Universiteit Leuven, Belgium; June 3-July 13, 1990.
16. **(Plenary Speaker)**: "Quantitative Diffuse Reflectance and Transmittance of Powders", 5th International Diffuse Reflectance Conference, August 12-17, 1990: Chambersburg, Penn., USA.
17. "Quantitative Diffuse Reflectance and Transmittance Photopyroelectric Spectroscopy of Powders", Seventeenth Annual Meeting of the Federation of Analytical Chemistry and Spectroscopy Societies, FACSS XVII, Cleveland, OH, Paper #864, October 7-12, 1990.
18. "Quantitative Diffuse Reflectance and Transmittance Spectroscopy of Powders", 42nd SE/46th SW Meeting of the Am. Chem. Soc., New Orleans, LA, Paper #72, December 5-7, 1990.
19. "Photoacoustic Frequency-Domain Depth Profiling of Continuously Inhomogeneous Solids. Theory and Quantitative Profilometry of Octylcyano-Biphenyl (8CB) Liquid Crystals", 121st Meeting of the Acoust. Soc. Am., Baltimore, MD, Paper #4PA4, April 29 - May 3, 1991.
20. "Photopyroelectric Pd-PVDF Hydrogen Sensor", 74th Canadian Chem. Conf., Hamilton, ON, Paper #AN-A2-9, June 2-6, 1991.
21. "Hamilton-Jacobi Theory of Thermal Wave Physics Applications", Physical Chemistry Colloquium, Brown University, Providence, R.I., Chemistry Dept.; May 3, 1991.
22. "Photothermal Detection at Surfaces and Interfaces: Development in Non-Conventional Diagnostics", 7th International Topical Meet. Photoacoustic Photothermal Phenomena, , Holland, August 26-30, 1991.
23. **(Principal Lecturer)** "Thermal Wave-based Materials Characterization and Non-destructive Evaluation; Critical Review", NATO Advanced Study Institute on High Temperature Superconductors-II: Physics and Materials Science, August 18-31, 1991, Halkidiki, Greece.
24. "Photothermal Rate-Window Spectroscopy", American Physical Society Meeting, March 16-20, 1992, Indianapolis, IN, Paper K3-3 (Presented by Z.H. Chen).
25. "Physical Fundamentals of Thermal Wave Science", 1992 Gordon Res. Conf. on Photoacoustic and Photothermal Phenomena, Colby Sawyer Coll., New London, N.H. June 8-12, 1992.
26. "Quantitative Diffuse Reflectance and Transmittance Photopyroelectric Spectroscopy of Silica Derivatized Powders", 75th Can. Chem. Conf. Exhibition, Edmonton, May 31-June 4; Symposia on Photoacoustic IR Spectroscopy.

27. **(Keynote Lecturer)** "Non-Conventional Photothermal Diagnostics", Workshop on Photoacoustics, International Laser Center and Russian Academy of Sciences, Moscow State University, Moscow, Russia, May 11-16, 1992.
28. "Photothermal Non-Destructive Depth Profilometry of Surface Layer Inhomogeneities in Opaque Solids", Can. Assoc. Res. Non-Destr. Eval. Meeting, Boucherville, Quebec, May 20-21, 1992.
29. "Perturbation Theoretical Approach to the Generalized Kubelka-Munk Problem in Non-Homogeneous Optical Media", 6th International Diffuse Reflectance Conference, Chambersburg, Penn., USA, August 9-14, 1992.
30. "Photoacoustic Frequency-Domain Depth Profiling of Continuously Inhomogeneous Solids. The Inverse Problem", 14th International Congress on Acoustics, Beijing, China, Sept. 3-10, 1992.
31. "Rate-Window Thermomodulation Spectrometry", International Workshop Physical Acoustics, Nanjing Univ., China, Sept. 14-17, 1992.
32. "Advances in Photothermal Solid-State Device Technology: Hydrogen-Gas Pd-PVDF Junction Photopyroelectric Sensor", Physics Colloquium, Univ. Quebec Trois Rivieres, P.Q., Physics Dept. November 24, 1992.
33. **(Invited Tutorial)** A. Mandelis with J. Power, "Random Signal Generation, Correlation and Spectral Analysis and its Instrumental Applications to Photoacoustic/Photothermal Nondestructive Evaluation", Tutorial T2. Amer. Phys. Soc. Meeting, March 21-26, 1993, Seattle, WA.
34. "An Overview of Photothermal Research in the Photothermal and Optoelectronic Diagnostics Laboratories at the University of Toronto", Colloquium; Inst. For Optics and Quantum Electronics, Friedrich-Schiller University, Jena, Germany, June 7, 1993.
35. "Thermal-Wave Techniques for *in-situ* control in semiconductor manufacturing", 1st Seminar on "In-situ Film Thickness and Temperature Measurement Systems for Semiconductor Manufacturing", Fraunhofer Inst. Integrated Circuits (FhG-11S), Erlangen, Germany, June 3-4, 1993.
36. "Purely thermal-wave-based Photopyroelectric Gas Sensor: Characterization and use as hydrogen and helium gas detector under ambient conditions" Amer. Chem. Soc. Meeting, Symposium of Div. Chem. Health Safety, Chicago, IL, July 21, 1993.
37. "Computational Thermal-Wave Slice Tomography with Back-Propagation and Transmission Reconstructions", 20th Ann. Rev. Progr. Quantitative NDE, Session 26, Bowdoin Coll., Brunswick, Maine, Aug. 1-6, 1993.
38. "Quantum Efficiency and Metastable Lifetime Measurements in Solid-State Laser Materials via Lock-in Rate-Window Infrared Photothermal Radiometry: Technique and Applications to Ruby ($\text{Cr}^{3+}:\text{Al}_2\text{O}_3$)", Paper #631, 20th Ann. Meet. Fed. Anal. Chem. Spectrosc. Soc. (FACSS XX), Detroit, MI, Oct. 17-22, 1993.
39. **(Invited Tutorial Introduction)** "Time, Frequency and Hybrid Spectral Domain Photothermal Instrumentation and Measurement methodologies", 8th Int. Topical Meet. Photoacoustic Photothermal Phenomena, Jan. 22-25, 1994, Guadeloupe (France).
40. "Investigation of Competitive Chemical and Thermal-Wave Effects in Photopyroelectric H_2 Sensors", 6th Canadian Hydrogen Workshop, February 23-25, 1994, Victoria, B.C., Canada.
41. "Laser Photothermal Techniques", 12th Symposium Thermophysical Properties, June 19-24, 1994, Boulder, CO.
42. Thermal-Wave Resonator Cavity: Characteristics and Use as a Sensor , 139 W.E. Heraeus Seminar on Transient Laser Gratings and Waves at Surface, Bad Honnef, Germany, January 23-26, 1995.
43. Advances in Photothermal Diagnostic Science at the University of Toronto: Techniques, Sensors and Materials Science , Instituto Politecnico Nacional, CINVESTAV, Dept. of Physics, Mexico City, Mexico, December 12-16, 1994.

44. Novel Techniques of Infrared Photothermal Radiometry for Manufacturing Applications , IBM Almaden Res. Labs, Manufacturing Research Seminar Series, San José, CA, March 22, 1995.
45. Maximum Dynamic Range, Thermal-Wave Based Pyroelectric Gas Sensor Devices , 78th Canadian Society for Chemistry Conference and Exhibition, Univ. Guelph, May 28-June 1, 1995.
46. Photopyroelectric-Quantum-Yield Spectroscopy and Quantum-Mechanical Photoexcitation-Decay Kinetics of the Ti^{3+} : Ion in Al_2O_3 ", 41st Int. Conf. Anal. Sci. Spectrosc., Windsor, ON, August 15, 1995.
47. "Advances in Photothermal Science at the University of Toronto: Techniques, Sensors and Materials Science", Univ. of Cairo, National Institute for Laser Enhanced Sciences, Cairo, Egypt, February 26, 1996.
48. "Photothermal Depth Profilometry and the Inverse Problem", Univ. of Cairo, National Institute for Laser Enhanced Sciences, Cairo, Egypt, February 29, 1996.
49. **(Keynote Speaker)** "The Structure of the Ontario Centres of Excellence and Laser Applications Programs within OLLRC and MRCO", Workshop on Laser Science, National Institute for Laser Enhanced Sciences, Univ. of Cairo, Egypt, March 2, 1996.
50. "Novel, Powerful and Ultrasensitive Photothermal Diagnostic Techniques: Shaping Up the State-of-the-Art in Industrial Physics in the 1990's", Natural Sciences Colloquium, Univ. of Cyprus. Nicosia, March 26, 1996.
51. "A Generalized Photoacoustic Methodology for Thermal Diffusivity Profile Reconstruction in Two-Layered Solids", Forum Acusticum 1996, Antwerp, Belgium, April 1-4, 1996, Paper 425.
52. "Novel, Powerful and Ultrasensitive Photothermal Non-Destructive Diagnostic Techniques for Materials Science in the 1990 's", AGIL '96: The First Conference of the Israel Materials Union, April 29-30, 1996, Nathania, Israel.
53. **(Guest Lecturer)** "New Methods for Ultra-Sensitive Non-Destructive Evaluation (NDE)", Dept. of Materials and Interfaces, Weizmann Institute of Science, Rehovot, Israel, April 28, 1996.
54. "Laser Photothermal Rate-Window and Radiometric Deep-Level Transient Spectroscopy of Semiconductors: State-of-the Art", Ruprecht-Karls-Universität Heidelberg, Physikalisch-Chemisches Institut, Heidelberg, Germany, May 6, 1996.
55. "Advances in Novel Photothermal Non-Destructive Diagnostic Techniques and Instrumentation for Manufacturing Applications at the University of Toronto", Colloquium, Forschungszentrum Karlsruhe, Institute für Instrumentelle Analytik, Karlsruhe, Germany, May 7, 1996.
56. "Non-Destructive Testing and Evaluation of Rail Tracks by a Photothermal Techniques", Material Movement Within a Steel Plant, Nashville, Tenn., October 6-8, 1996.
57. "Noncontact Photothermal Depth Profiling of Continuously Inhomogeneous Semiconductors", 23rd Annual Review of Progress in QNDE, Brunswick, Maine, July 28-August 2, 1996. (Presented by A. Salnick).
58. "Noncontacting Photothermal Radiometry of SiO_2/Si MOS Capacitor Structures", 23rd Annual Review of Progress in QNDE, Brunswick, Maine, July 28-August 1, 1996. (Presented by A. Salnick).
59. "Infrared Photothermal Radiometric Deep-Level Transient Spectroscopy of Semiconductors", 9th Int. Conf. on Photoacoustic and Photothermal Phenomena, Invited Structured Session on: NDE and Characterization of New Materials, Nanjing, China, June 27-30, 1996.
60. "Remote Laser-Induced Infrared Radiometric Non-Destructive Monitoring of Industrial Semiconductor Substrates and Devices", American Physical Society Meeting, March 17-21, 1997, Kansas City, MO, Paper G4-4 (Presented by A. Salnick).
61. "Development of a Dual Photopyroelectric/Optical-Transmittance Hydrogen Sensor", Symposium on "Chemical Sensors and Biosensors" of the 80th Canadian Society for Chemistry Conference and Exhibition, Windsor, ON, June

- 1-4, 1997.
62. "Electronic Materials Laser Photothermal NDE: The State-of-the Art", Session on *Electronic Materials*, 3rd Gordon Research Conference on Photoacoustic and Photothermal Phenomena, Oxford, UK, September 14-19, 1997.
 63. "Thermal-Wave Resonant Cavity: An Ultrasensitive Thermal Diffusivity Sensor", 13th Symposium on Thermophysical Properties, Boulder, CO, June 22-27, 1997.
 64. **(Keynote Speaker)** "Advances in Lock-in Amplifier Signal Processing Optimization", III International Workshop on *Advances in Signal Processing for Non-Destructive Evaluation of Materials*, Univ. Laval, Quebec City, Quebec, August 5-8, 1997.
 65. "Advances in Photothermal Diagnostic Science at the University of Toronto: Techniques, Sensors and Materials", Invited Colloquium Presentation, Applied Physics Laboratory, and Johns Hopkins University, Laurel, MD, November 5, 1997.
 66. "A Novel Ultra-sensitive Thermal-Wave Resonant Cavity Sensor: Principles and Applications to the In-Situ Measurement of Thermophysical Properties of Gases and Vapors", Syncrude Research Center, Edmonton, AB, January 14, 1998.
 67. **(Plenary Speaker)** "Laser Infrared Photothermal Radiometry: Physical Principles and Non-Destructive Characterization of Materials and Processes in the Metals, Coatings and Electronics Industries", XVIII National Congress of the Mexican Society of Surface Science and Vacuum, Puerto Vallarta, Mexico, Sept. 28- October 1, 1998.
 68. "Nonlinear Photothermal Response in 3D Geometry: A General Theoretical Model and Experimental Results for Tungsten", (with Salnick, A., Opsal, J., Rosencwaig, A); Paper 20.9, 25th Annual Review of Progress in QNDE, Snowbird, UT, July 19-24, 1998.
 69. **(Keithley Award Invited Speaker)** "A Century of Photothermal and Photoacoustic Spectroscopies and Microscopies", Paper LC17 4, 1999 Centennial Meeting of the American Physical Society, Atlanta, GA, March 20-26, 1999.
 70. **(Plenary Lecture)** "Diffusion-Wave Diagnostics: Emerging Quality-Control Technologies for Materials NDE / NDT", 2nd Int. Conf. on "Emerging Technologies in NDT", Athens, Greece, May 24-26, 1999.
 71. "Thermal-Wave Interference and Boundary Reflection: Fact or Fiction?", Fourth Gordon Research Conference on Photoacoustic and Photothermal Phenomena, New London, NH, June 27- July 2, 1999.
 72. "Photothermal Thin-Film Diagnostics with Novel Photopyroelectric Methodologies", 9th European Meeting on Ferroelectricity, EMF-9, Prague, Czech Republic, July 12-16, 1999.
 73. "Modulated Laser Photothermal and Luminescence Techniques for Dental Caries Diagnostics", SPIE Int. Symp. Biomedical Optics, BIOS 2000, San Jose, CA, January 22-28, 2000.
 74. **(Keithley Award Invited Speaker)** "Novel Lock-In Waveform Techniques for Measurement Signal-to-Noise Ratio and Dynamic-Range Enhancement in Highly Noised Experiments", Paper I6.04, Meeting of the American Physical Society, Minneapolis, MN, March 20-24, 2000.
 75. "Novel Modular Thin-Film Hydrogen Sensors based on Optical and Photothermal Signal Modulation", Workshop on *Hydrogen and Diamond Related Topics*, Institute for Materials Research, Limburgs University Center, Diepenbeek-Hasselt, Belgium, 4th March 2000,
 76. "Thermal Diffusivity Depth Profile Reconstruction of Rough Surfaces by Heuristically Eliminating Roughness", European Commission HARDPHOTOTEC Workshop on *Hardness Measurements on Steel: Conventional and Alternative Non-Destructive Methods*, Ispra, Italy, 13 – 14 March, 2000. (Presented by L. Nicolaidis).
 77. **(Plenary Lecture)** "Novel Lock-In Waveform Techniques for Measurement Signal-to-Noise Ratio and Dynamic-Range Enhancement in Highly Noised Experiments" 11th Int. Conf. Photoacoustic Photothermal Phenomena, Kyoto, Japan, June 25-29, 2000.
 78. "Thermal-Wave Depth Profilometric Non-Destructive Evaluation of Automotive Coatings and Steels", Symposium on

Physical Sciences and Advanced Vehicle Technologies, June 7-8, 2000, York University, Toronto, ON

79. "Novel Common-Mode Rejection Lock-in Amplifier Analytical Spectrometry and its Applications to photothermal Chemometric Systems", Paper RAP03, 2000 Federation of Analytical Chemistry and Spectroscopy Society (FACSS) Conference, Sept. 24-28, 2000, Nashville, TN
80. **(Plenary Lecture;** (Conferencia Magistral)) "Diffusion Waves and their Uses", CINVESTAV, Mexico City, December 5, 2000.
81. Short course to research staff: "Thermal Waves and their Uses", CINVESTAV, Queretaro, Mexico, December 6-8, 2000.
82. "Experimental and Computational Aspects of Optical Property Determination of Turbid Media using Frequency-Domain Laser Infrared Photothermal Radiometry", session MO-A5, Canadian Association of Physicists (CAP) Congress in Victoria, BC, 18 June 2001.
83. "Lock-in Common Mode Rejection Demodulation: A Novel Background-Suppression Signal Generation Methodology" Canadian Association of Physicists Congress, Victoria, BC, June 17-21 (2001).
82. "Ion-Implantation Dose High-Resolution Monitoring in Si Wafers using Laser Infrared Photothermal Radiometry with Lock-In Common-Mode Rejection Demodulation" Tutorial T2.3, IV Int. Workshop on Advances in Signal Processing for Non-Destructive Evaluation of Materials", Laval University, Quebec City, August 7-10 (2001).
83. "Progress in Theoretical, Experimental and Computational Investigations in Turbid Tissue Phantoms and Human Teeth using Laser Infrared Photothermal Radiometry", ThermoSense XXIV, Orlando, FL, 1-5 April 2002 (paper 4710-42).
84. "Andrew C. Tam: Memories of the Man, the Scientist and the Friend", in Laser Ultrasonics, 2001 Gordon Conference on Photoacoustic and Photothermal Phenomena, Queen's College, Oxford, UK, August 19-24 (2001).
85. **(Keynote Speaker)** "Photo-Carrier Radiometry of Semiconductors: A Novel Powerful Optoelectronic Diffusion-Wave Technique for Silicon Process Non-Destructive Evaluation", 3rd Int. Conf. On "Emerging Technologies in Non-Destructive Testing", Thessaloniki, Greece, May 26-28 (2003).
86. "Advances in Photothermal Radiometry and Luminescence Diagnostics of Natural Carious and Artificial Sub-surface Lesions in Human Teeth", Gordon Research Conference on Photoacoustic and Photothermal Phenomena, Colby-Sawyer College, New London, NH, June 8-13 (2003).
87. "Frequency Domain Infrared Photothermal Radiometry and Modulated Laser Luminescence", The Indiana Conference, School of Dentistry, Indiana University – Purdue University, Indianapolis, May 21 – 23 (2003); presented by Stephen H. Abrams.
88. "Photothermal Diagnostics of Engineering Materials", Dept. of Physics, Festkoerperspektroskopie III, Ruhr Univ. Bochum, Germany; Oct. 24, 2003.
89. "Photo-Carrier Radiometry of Semiconductors", Dept. of Physics, Festkoerperspektroskopie III, Ruhr Univ. Bochum, Germany; Nov. 7, 2003.
90. S. Abrams and A. Mandelis, "Frequency Domain Infrared Photothermal Radiometry and Modulated Laser Luminescence", The Indiana Conference, School of Dentistry, Indiana University – Purdue University, Indianapolis, May 21 – 23 (2003).
91. "Laser photothermal metrologies for the semiconductor fabs", KLA Tencor, San Jose, CA; Nov. 19, 2003.
92. "Photo-carrier Radiometry metrology for Si ion implantation monitoring", Therma-Wave, Inc., Fremont, CA; Nov. 20, 2003.
93. "Laser-induced Diffusion-Wave Science and its Applications", Graduate Faculty Seminar, Solid-State Physics Dept., Ruhr Univ. Bochum, Germany; January 22, 2004.

94. "Biomedical photothermal and photothermoacoustic diagnostics for cancer imaging and dental caries prevention", Dept. of Physics, Festkoerperspektroskopie III, Ruhr Univ. Bochum, Germany; January 23, 2004.
95. "Laser-Induced Diffusion-Wave Diagnostic Technologies: Go where no light has gone before", Physics Dept., Univ. of Cyprus, Nicosia, Cyprus; March 1, 2004.
96. "Diffusion-Wave Physics and Industrial and Biomedical Applications", Dept. of Physics, University of Athens, Panepistimioupolis Athens, Greece; April 15, 2004.
97. "Dental Depth Profilometric Diagnosis of Pit and Fissure Caries using Frequency-Domain Infrared Photothermal Radiometry and Modulated Laser Luminescence", Academic Center for Dental Sciences, Free University of Amsterdam, Amsterdam, the Netherlands; April 20, 2004.
98. Y. Fan, A. Mandelis, G. Spirou, A. Vitkin and W. Whelan, "Three-dimensional photothermoacoustic depth profilometric imaging by use of linear frequency sweep heterodyne method", oral paper 5320-17, SPIE BiOS Conf. # 5320, Jan. 25 – 27, 2004, San Jose, CA.
99. A. Mandelis, Y. Fan and A. Vitkin, "Laser Photo-thermo-acoustic Frequency Swept Heterodyned Lock-in Depth Profilometry for Three-Dimensional Sub-surface Tissue Imaging", Instr. and Techn. in Biomed. Physics I, Canadian Association of Physicists Congress, June 13-16, 2004; Winnipeg, Manitoba.
100. **(Plenary Speaker)** "Photo-Carrier Radiometry of Electronic Solids: A Powerful New Optoelectronic Diffuse Carrier-Density-Wave Methodology" paper 10L-01, 13th Int. Conf. Photoacoustic Photothermal Phenomena, Rio de Janeiro, Brazil; July 5-8, 2004.
101. A. Mandelis, D. Shaughnessy, J. Tolev and J. Meijer, "Two-beam cross-modulation photo-carrier radiometry of electronic solids. Principles and applications to ion-implanted silicon", Canadian Association of Physicists Congress, Vancouver, BC, June 5 – 8, 2005.
102. A. Mandelis, C.H. Wang, I. Delgadillo-Holfort, M. Pawlak and J. Pelzl, "Contactless characterization of photo-carrier recombination processes in Si using rate-window photo-carrier radiometry", Canadian Association of Physicists Congress, Vancouver, BC, June 5 – 8, 2005.
103. **(Plenary Speaker)** A. Mandelis, "Photo-Carrier Radiometry", Session on Non-Destructive Evaluation, June 30, 2005; Gordon Research Conference on Photoacoustic and Photothermal Phenomena, Trieste, Italy, June 26 – July 1, 2005.
104. **(Keynote Presentation; Special Events Session)** A. Mandelis, "Trends in biothermophotonics and bioacoustophotonics of tissues", SPIE Int. Conf. on Optics and Optoelectronics (Acousto-optics and Photoacoustics), Warsaw University of Technology, Warsaw, Poland, August 28 – Sept. 2, 2005.
105. "Laser Bioacoustophotonics", Presentation to Depts. of Physics and Biophysics, Nicolaus Copernicus University, Torun, Poland, August 31, 2005.
106. "Trends in Bioacoustophotonic Imaging of Tissues", Seminar Series in Analytical Chemistry, Dept. of Chemistry, Univ. of Toronto, March 30, 2006.
107. **(OCE student poster competition accompanied with a \$2,000 award)** A. Matvienko, R. Jeon, A. Mandelis and S. Abrams, "Biothermophotonic method for the diagnosis of incipient dental caries", Discovery 2006 Conference – Ontario Centers of Excellence, Toronto, Canada, February 2006. Top award talk.
108. "Bioacoustophotonic Imaging of Tissues", Analytical Chemistry Graduate Seminar, Dept. of Chemistry, University of Toronto, March 30, 2006.
109. "Photothermoacoustic Imaging of Turbid Media", Biophotonics group research seminar series, UofT – Ryerson Univ., Princess Margaret Hosp., May 11, 2006.
110. "Bioacoustophotonic Depth Selective Imaging of Turbid Media and Tissues. Instrumentation and Measurements", Special Physics-in-Canada session PiC-II, 2006 CAP Congress, St. Catherines, ON, June 12, 2006.

111. A. Matvienko and A. Mandelis, "Characterization of Dental Demineralization using a Biothermophotonic Technique", Sixteenth Symposium on Thermophysical Properties, Boulder, CO, July 30 – Aug. 4, 2006.
112. **(Keynote Presentation on the occasion of the 20th Anniversary of the Institute of Physics of the National Polytechnic of Mexico in Guanajuato)** A. Mandelis, "*Diffusion-Wave Science and Technologies: They go where no light has gone before*". Sept. 28 - 29, 2006. Other keynote speakers included the Nobel laureates Leon Lederman, Illinois Institute of Technology, and Charles H. Townes, University of California.
113. A. Mandelis, "Dental Biothermophotonics: How Photothermal Methods are winning the Race with X-Rays for Dental Caries Diagnostic Needs of Clinical Dentistry", 14th Int. Conf. Photoacoustic & Photothermal Phenomena, Cairo, Egypt, January 6 – 9, 2007, invited talk I 13.5.
114. S. A. Telenkov and A. Mandelis, "Fourier-Domain Methodology for Depth-Selective Photothermoacoustic Imaging of Tissue Chromophores", 14th Int. Conf. Photoacoustic & Photothermal Phenomena, Cairo, Egypt, January 6 – 9, 2007, invited talk I 13.4.
115. A. Mandelis and S. Telenkov, "Fourier-Domain Biophotoacoustic Sub-surface Depth Selective Amplitude and Phase Imaging of Turbid Phantoms and Biological Tissue" APS March meeting, Paper B38.0001, Denver, CO, March 5-9, 2007.
116. A. Mandelis and J. Xia, "Deep Level Photo-Thermal Spectroscopy", 4th Int. Conf. Emerging Technologies in Non-Destructive Testing, April 2-4, 2007 (Stuttgart, Germany).
117. A. Mandelis, "Biophotoacoustic Depth Selective Imaging of Turbid Media and Tissues: Instrumentation and Measurements"; and "Dental Biothermophotonics: A Quantitative Photothermal Analysis of Early Dental Demineralization", Optical and Ultrasonic Technologies for Biomedical Applications, NRC Boucherville, Quebec, May 4 (2007).
118. A. Mandelis, R. Jeon, A. Matvienko and S. Abrams, "Dental Thermophotonics : Laser Photothermal Methods vs. X-rays in the Race for Dental Caries Diagnostics in Clinical Dentistry", 2007 Canadian Association of Physicists (CAP) Congress, paper TU-P10-1, June 17 – 20, 2007, Univ. of Saskatchewan, Saskatoon, Canada.
119. A. Mandelis, "Diffusion-Wave Science and Diagnostic Technologies" Summer School 2007, National Research Center in Natural Sciences "Demokritos", Athens, Greece, July 16 – 20, 2007.
120. A. Mandelis, "Photo-Carrier Radiometry and Deep-Level Photo-Thermal Spectroscopy", Summer School 2007, National Research Center in Natural Sciences "Demokritos", Athens, Greece, July 16 – 20, 2007.
121. A. Mandelis, "Dental Thermophotonics: how laser photothermal methods are winning the race with x-rays in detecting dental cavities", Professional Engineers of Ontario, Etobicoke Chapter, Islington Golf Country Club, November 7, 2007.
122. A. Mandelis, "Deep Level Photo-Thermal Spectroscopy: Physical Principles and Optoelectronic NDE of Multiple Trap States in Semiconductors", Session on Non-Destructive Evaluation, June 30, 2005; Gordon Research Conference on Photoacoustic and Photothermal Phenomena, February 10-15, 2008, Crowne Plaza, Ventura, CA, USA.
123. A. Mandelis, "Dental thermophotonics", 10th Spring School in Acousto-optics and Photoacoustics, Gdansk, Poland, May 12-15, 2008.
124. A. Mandelis, "Investigation of Demineralization and Remineralization of Human Teeth Using Infrared Photothermal Radiometry and Modulated Luminescence", Canadian Association of Physicists Annual Congress, June 8 – 11, 2008; Paper TU-A5-1, Biomedical Instrumentation, June 10 (Laval University, Quebec City).
125. S. Telenkov and A. Mandelis, "Photothermoacoustic Imaging of breast tissue: numerical simulation and detection analysis", Canadian Association of Physicists Annual Congress, June 8 – 11, 2008 Paper TU-A5-2, Biomedical Instrumentation, June 10 (Laval University, Quebec City).
126. A. Matvienko, A. Mandelis, R. Jeon, S.H. Abrams, and B.T. Amaechi, "Quantitative Analysis of Incipient Dental

- Mineral Loss”, International Association of Dental Research (IADR) Conference, July 2-5, 2008 Paper 0527, Convention Centre, Toronto, ON, Canada.
127. R. Jeon, A. Hellen, A. Matvienko, A. Mandelis, S.H. Abrams, and B.T. Amaechi, “Thermophotonic Detection of Demineralized Root and Enamel Lesions”, International Association of Dental Research (IADR) Conference, July 2-5, 2008 Paper 0528, Convention Centre, Toronto, ON, Canada.
 128. A. Hellen, R. Jeon, S.H. Abrams, A. Mandelis, and B.T. Amaechi, “Photothermal and Modulated Luminescence Detection of Demineralized Tooth Restoration Interfaces”, International Association of Dental Research (IADR) Conference, July 2-5, 2008 Paper 0529, Convention Centre, Toronto, ON, Canada.
 129. A. Mandelis, “Theoretical and Experimental Investigation of Demineralization and Remineralization of Human Teeth Using Infrared Photothermal Radiometry and Modulated Luminescence”, 2008 Int. Conf. on Advanced Laser Technologies (ALT), September 13 – 18, 2008 Siofok, Hungary.
 130. A. Mandelis, “Two-beam cross-modulation photocarrier radiometry. Principles and contrast amplification in semiconductor subsurface imaging”, Virtual Conference on Nanoscale Science and Technology 2008 (2008 VC-NST), Symposium H: Characterization of Nanostructured Materials for Solar and Optoelectronic Devices, July 24 – 29 Univ. of Arkansas, Fayetteville, AK.
 131. A. Mandelis, C. Kwan and A. Matvienko, “Dynamic photophysical processes in laser irradiated human cortical skull bone”, SPIE BiOS Conf. # 7166 (“Optics in Bone Biology and Diagnostics”) , Paper 7166-10, session 3. Jan. 24 - 29, 2009, Convention Center, San Jose, CA.
 132. **(SPIE Distinguished Guest Lecturer)** A. Mandelis, “Photothermoacoustic imaging of biological tissues: Signal generation and maximum depth characterization comparison of time- and frequency-domain measurements”, University of Connecticut (Storrs); Lecture sponsored by the UConn SPIE Student Chapter, April 23, 2009.
 133. **(Plenary Speaker-Yeram Touloukian Award)** A. Mandelis, “Thirty years of unconventional techniques, instrumentation and measurements in Photothermal Thermophysics”, 17th NIST/ASME Symposium of Thermophysical Properties, June 21-25, 2009, Boulder, CO; Monday June 22.
 134. A. Mandelis and J. Xia, “Deep Level Photo-Thermal Spectroscopy of Defect States in Semi-Insulating GaAs: A Combined Temperature-, Pulse-Rate- and Time-Domain Study of Defect State Kinetics”, 2009 CAP Congress, Moncton, New Brunswick, June 7-10.
 135. **(CAP Industrial and Applied Physics Medal Plenary Speaker)** A. Mandelis, “Diffusion-Wave Diagnostic Techniques in Industrial and Medical Physics: They go where no light has gone before!”, 2009 CAP Congress, Moncton, New Brunswick, June 7-10.
 136. **(Invited Tutorial Lecture)** A. Mandelis and J. Xia, “Broadening effects and ergodicity in Deep-Level Photothermal Spectroscopy of defect states in semi-insulating GaAs: A combined temperature-, pulse-rate-, and time-domain study of defect state kinetics”, 15th Int. Conf. on Photoacoustic and Photothermal Phenomena, Leuven, Belgium, July 19 – 23, 2009.
 137. **International Photoacoustic and Photothermal Association (IPPA) Senior Prize Plenary Lecture.** A. Mandelis, “Highlights of current research at the Center for Advanced Diffusion-Wave Technologies: We go where no light has gone before”, 15th Int. Conf. on Photoacoustic and Photothermal Phenomena, Leuven, Belgium, July 23, 2009.
 138. A. Mandelis, Guest Speaker Invited Lecture, “Diffusion Waves and Applications”, Dept. of Mechanical and Materials Engineering,, Univ. of Western Ontario, Oct. 5, 2009
 139. A. Mandelis, A. Hellen and Y. Finer, “Photothermal radiometry and modulated luminescence examination of demineralized and remineralized dental lesions”, SPIE BiOS Conf. # 7548F (“Optics in Bone Biology and Diagnostics”) , Paper 7548F-150, Session 3. Jan. 23 - 28, 2010, Moscone Convention Center, San Francisco, CA.
 140. A. Mandelis, “The development of the photoacoustic radar and applications to subsurface depth-selective imaging of biological tissues for early cancerous lesion detection”, Ontario-on-a-Chip, University of Toronto, May 20, 2010.
 141. A. Mandelis, “Biothermophotonics”, First Mediterranean International Workshop on Photoacoustic & Photothermal

Phenomena, Center Ettore Majorana in Erice (Sicily, Italy), July 11-18, 2010.

142. S. Telenkov and A. Mandelis, "Photoacoustic sonar: principles of operation and imaging". First Mediterranean International Workshop on Photoacoustic & Photothermal Phenomena, Center Ettore Majorana in Erice (Sicily, Italy), July 11-18, 2010.
143. **(Keynote Plenary Speaker)** A. Mandelis, "Infrared Lock-in Carrierography (Photocarrier Radiometric Imaging) of Semiconductors and Si Solar Cells", QIRT 2010, The 10th International conference on: Quantitative Infrared Thermography, Quebec City, Canada, July 27-30, 2010.
144. A. Mandelis, A. Hellen, B. Amaechi and Y. Finer, "Quantitative evaluation of demineralization and remineralization of simulated dental enamel caries using photothermal radiometry and modulated luminescence", 18th Int. Conf. on Advanced Laser Technologies (ALT '10), September 11 – 16, 2010, Amsterdam, Holland.
145. **(Keynote Plenary Speaker)** A. Mandelis, "Lock-in Carrierography Photocarrier Radiometric Imaging) of defects and dislocations in industrial Si solar cells", 30th Annual Congress of the Mexican Vacuum Society, September 25 – October 1, 2010, Cancun, Mexico.
146. A. Mandelis, "Dental Thermophotonics: Dental caries diagnostic imaging and depth profiling in clinical dentistry", CINVESTAV, Merida, Mexico, Sept. 27, 2010.
147. **(Seminars in Mechanical and Industrial Engineering, Invited Lecture)** A. Mandelis, "Photothermoacoustic Imaging of biological tissues: Comparison of Time and Frequency-Domain Measurements", Mechanical and Industrial Engineering, Univ. of Toronto, November 12, 2010.
148. A. Mandelis, "New biomedical photoacoustic and thermophotonic imagers and biosensors: State of the science and technology", College of Optics and Photonics (CREOL), University of Central Florida, Orlando, April 7, 2011.
149. S. Telenkov and A. Mandelis, "Photoacoustic scanning tomography with coded optical excitation: Theory and experiment", TU-C0220-04, Joint American Association of Physicists in Medicine (AAPM)/COMP Meeting, Vancouver BC, July 31 – Aug. 4, 2011.
150. A. Mandelis, "High-frequency direct and heterodyne lock-in carrierographic imaging of microcrystalline silicon solar cells", CAP Congress, Memorial University of Newfoundland (St. John's, Newfoundland), June 13 – 17, 2011.
151. A. Mandelis, B. Lashkari and S. Telenkov, "The Biomedical Photoacoustic Radar Imager: Principles, Signal-to-Noise Ratio, Contrast and Resolution", Session on New Hybrid Modalities in Medical Imaging – Monday June 20, Fields-MITACS Conf. on Mathematics of Medical Imaging, University of Toronto, June 20 – 24, 2011.
152. S. Telenkov and A. Mandelis, "Frequency-Domain Photoacoustics: Specifics of Signal Processing and Image Reconstruction", Session on New Hybrid Modalities in Medical Imaging – Tuesday June 21, Fields-MITACS Conf. on Mathematics of Medical Imaging, University of Toronto, June 20 – 24, 2011.
152. A. Mandelis, "Photothermal Thermophysics: techniques for the measurement of thermophysical properties of matter", 19th European Conf. on Thermophysical Properties, Thessaloniki, Greece, August 28 – Sept. 1, 2011.
153. **(Leading seminar, Special Session on Photothermal and Photoacoustic Thermophysics)**, A. Mandelis "Biomedical diagnostic techniques and imaging based on photothermal thermophysics: Blood Glucose Biosensor and early dental enamel caries imager", 19th European Conf. on Thermophysical Properties, Thessaloniki, Greece, August 28 – Sept. 1, 2011.
154. **(Conference Opening Ceremony Plenary Speaker)** A. Mandelis, "Photoacoustic, Photothermal and Diffusion-Wave Sciences in the 21st Century: Triumphs of the past set the trends for the future", 16th Int. Conf. on Photoacoustic and Photothermal Phenomena (ICPPP), Merida, Mexico, Nov. 27 – Dec. 1, 2011.
155. **(APS J. F. Keithley Award for Advances in Measurement Science Lecture Speaker)** A. Mandelis, "Thermophotonic and Photoacoustic Radar Imaging Methods for Biomedical and Dental Imaging", APS March Meeting 2012, Boston MA, Feb. 27 – March 2, 2012. Session T46: Invited Keithley Award Session.

V.2. CONTRIBUTED PRESENTATIONS (2003 -)

1. A. Mandelis, "Photothermal Diagnostics of Engineering Materials", Dept. of Physics, Festkoerperspektroskopie III, Ruhr Univ. Bochum, Germany; Oct. 24, 2003.
2. A. Mandelis, "Photo-Carrier Radiometry of Semiconductors", Dept. of Physics, Festkoerperspektroskopie III, Ruhr Univ. Bochum, Germany; Nov. 7, 2003.
3. A. Mandelis, "Laser photothermal metrologies for the semiconductor fabs", KLA Tencor, San Jose, CA; Nov. 19, 2003.
4. A. Mandelis, "Photo-carrier Radiometry metrology for Si ion implantation monitoring", Therma-Wave, Inc., Fremont, CA; Nov. 20, 2003.
5. A. Mandelis, "Laser-induced Diffusion-Wave Science and its Applications", Graduate Faculty Seminar, Solid-State Physics Dept., Ruhr Univ. Bochum, Germany; January 22, 2004.
6. A. Mandelis, "Biomedical photothermal and photothermoacoustic diagnostics for cancer imaging and dental caries prevention", Dept. of Physics, Festkoerperspektroskopie III, Ruhr Univ. Bochum, Germany; January 23, 2004.
7. A. Mandelis, "Laser-Induced Diffusion-Wave Diagnostic Technologies: Go where no light has gone before", Physics Dept., Univ. of Cyprus, Nicosia, Cyprus; March 1, 2004.
8. A. Mandelis, "Diffusion-Wave Physics and Industrial and Biomedical Applications", Dept. of Physics, University of Athens, Panepistimioupolis Athens, Greece; April 15, 2004.
9. A. Mandelis, "Dental Depth Profilometric Diagnosis of Pit and Fissure Caries using Frequency-Domain Infrared Photothermal Radiometry and Modulated Laser Luminescence", Academic Center for Dental Sciences, Free University of Amsterdam, Amsterdam, the Netherlands; April 20, 2004.
10. A. Mandelis, C.H. Wang, I. Delgadillo-Holfort, M. Pawlak and J. Pelzl, "*Contactless characterization of photo-carrier recombination processes in Si using rate-window photo-carrier radiometry*", Canadian Association of Physicists Congress, Vancouver, BC, June 5 – 8, 2005.
11. A. Mandelis and A. Matvienko, "High-Precision And High-Resolution Measurements Of Thermal Diffusivity And Infrared Emissivity Of Water-Methanol Mixtures Using A Pyroelectric Thermal Wave Resonator Cavity", Canadian Association of Physicists Congress, Vancouver, BC, June 5 – 8, 2005.
12. A. Matvienko and A. Mandelis, "Photopyroelectric Measurements of Thermal Diffusivity of Liquid Mixtures at Low Concentrations", 38th AIAA Thermophysics Conference, 6-9 June 2005, Toronto, Canada. Session: Thermophysics Properties and Measurements.
13. A. Matvienko and A. Mandelis, "Thermal-Wave-Cavity Thermophysical Water Pollution Sensor using the CMRD Method", Gordon Research Conference on Photoacoustic and Photothermal Phenomena, 26 June - 1 July 2005, Trieste, Italy.
14. A. Matvienko and A. Mandelis, "Thermal-Wave Resonator Cavity: Modeling and Applications for Water Mixtures", XXI International Congress of Theoretical and Applied Mechanics, 15-21 August 2004, Warsaw, Poland.
15. R. Jeon., A. Matvienko, A. Mandelis., S. Abrams., B. Amaechi., and G. Kulkarni, "Interproximal caries detection using frequency-domain infrared photothermal radiometry", 53rd Annual ORCA Congress, Glasgow, UK, July 2006.
16. A. Matvienko, R. Jeon, A. Mandelis S. Abrams, and G. Kulkarni, "Detection of enamel demineralization with dental photothermal radiometry: experiments and theoretical modeling", 53rd Annual ORCA Congress, Glasgow, UK, July 2006.
17. A. Matvienko, R. Jeon, A. Mandelis, S. Abrams. And G. Kulkarni, "Detection of artificial surface and subsurface dental caries mineral loss using laser photothermal radiometry. 52nd Annual ORCA Congress, Indianapolis, USA, July 2005.

18. A. Matvienko and A. Mandelis, "Ultra-high-resolution thermal-wave sensor: applications to water-ethanol mixtures", AIChE 2005 Annual meeting, Cincinnati, USA, October 2005.
19. A. Matvienko and A. Mandelis, "Photopyroelectric measurements of thermal diffusivity of liquid mixtures at low concentrations". 38th AIAA Thermophysics Conference, Toronto, Canada, June 2005.
20. A. Mandelis, Analytical Chemistry Graduate Seminar, Dept. of Chemistry, University of Toronto, "Bioacoustophotonic Imaging of Tissues", March 30, 2006.
21. A. Mandelis, Biophotonics group research seminar series, UofT – Ryerson Univ., "Photothermoacoustic Imaging of Turbid Media", Princess Margaret Hosp., May 11, 2006.
22. A. Matvienko and A. Mandelis, "Characterization of Dental Demineralization using a Biothermophotonic Technique", Sixteenth Symposium on Thermophysical Properties, Boulder, CO, July 30 – Aug. 4, 2006.
23. A. Matvienko, R. Jeon and A. Mandelis, "Dental Photothermal Radiometry: Theoretical Analysis", APS March meeting, Paper R9 8, Denver, CO, March 5-9, 2007.
24. A. Mandelis, "Bioacoustophotonic Dept-Selective Imaging of Turbid Media and Tissues: Instrumentation and Measurements", paper 71-GniZ-252, Photonics North 2006, June 5 – 8 (2006).
25. C-H. Wang, A. Mandelis and J. A. Garcia, "Non-Contact Case Depth Monitoring of Industrial Hardened Parts Using Laser Infrared Photothermal Radiometry", 4th Int. Conf. Emerging Technologies in Non-Destructive Testing, April 2-4, 2007 (Stuttgart, Germany).
26. Y. Liu, A. Mandelis, M. Choy and C.-H. Wang, "Real-time remote temperature and thickness measurement of titanium nitride thin coatings growing on steel using laser thermorefectance optical thermometer", 14th Int. Conf. Photoacoustic & Photothermal Phenomena, Cairo, Egypt, January 6 – 9, 2007, paper 3O12.4.
27. C. Wang, A. Mandelis and Y. Liu, "Influence of beam profile on measurement sensitivity of physical properties in composite structures using photothermal techniques", 14th Int. Conf. Photoacoustic & Photothermal Phenomena, Cairo, Egypt, January 6 – 9, 2007, paper 11O3.13.
28. C. Wang and A. Mandelis, "Effective hardness case depth determination in heat treated industrial steel products using photothermal radiometry", 14th Int. Conf. Photoacoustic & Photothermal Phenomena, Cairo, Egypt, January 6 – 9, 2007, paper 13O9.1.
29. J. A. Garcia and A. Mandelis, "Non-contact case depth monitoring of industrial hardened parts using laser infrared photothermal radiometry", 14th Int. Conf. Photoacoustic & Photothermal Phenomena, Cairo, Egypt, January 6 – 9, 2007, paper 13O11.1.
30. A. Matvienko, R. J. Jeon, A. Mandelis, S. H. Abrams and B. T. Amaechi, "Photothermal Detection of Incipient Dental Caries: Experiment and Modeling", Photonics East, Sept. 9 – 12 (2007), Boston MA.
31. A. Mandelis, A. Matvienko and S. H. Abrams, "Theoretical Analysis of Dental Demineralization using Photothermal Radiometry", (SPIE BiOS, San Jose, USA, January 2008).
32. A. Hellen, R. Jeon, S.H. Abrams, A. Mandelis, and B.T. Amaechi, "Photothermal and Modulated Luminescence Detection of Demineralized Tooth Restoration Interfaces", International Association of Dental Research (IADR) Conference, July 2-5, 2008 Paper 0529, Convention Centre, Toronto, ON, Canada.
33. A. Mandelis, C.-H. Kwan and A. Matvienko, "Dynamic photophysical processes in laser irradiated human cortical skull bone measured by means of modulated luminescence and infrared photothermal radiometry", SPIE BiOS Conf. # 7548F ("Optics in Bone Biology and Diagnostics"), Paper 7548F-148, Session 2. Jan. 23 - 28, 2010, Moscone Convention Center, San Francisco, CA.
34. S. A. Telenkov, B. Lashkari and A. Mandelis, "Photothermoacoustic imaging comparison of pulsed laser and frequency-domain (radar) modalities: signal-to-noise ratio, contrast, and resolution enhancement using nonlinear chirp modulation", Paper 7564-144, Poster Session. Jan. 23 - 28, 2010, Moscone Convention Center, San Francisco, CA.
35. X. Guo, A. Mandelis, A. Matvienko, K. Sivagurunathan and B. Zinman, "Wavelength-modulated differential photothermal radiometry for non-invasive blood glucose detection", Paper 7564-145, Poster Session. Jan. 23 - 28, 2010, Moscone Convention Center, San Francisco, CA.

36. N. Tabatabaei, A. Mandelis and B. T. Amaechi, "Thermophotonic lock-in imaging: A dynamic thermography technique for detecting early carious lesions in human teeth" Inaugural MIE Research Symposium, University of Toronto, April 30, 2010.
37. B. Lashkari and A. Mandelis, "The Photothermoacoustic Radar: A Novel Tissue Depth-Selective Imaging Method for Cancer Tumor Diagnosis", MIE Research Symposium, University of Toronto, April 30, 2010. **(Poster; won honorable mention for poster presentation).**
38. N. Tabatabaei and A. Mandelis, CADIFT Lab, "Photoacoustic & diffusion-wave diagnostic instrumentation and imaging techniques", Canada Research Chairs: Thinking Ahead for a Strong Future, Nov 24-25, 2010, Metro Toronto Convention Centre, Toronto, Canada (Poster).
39. A. Mandelis, "Infrared Lock-in Carrierography (Photocarrier Radiometric Imaging) of Si Solar Cells", paper 500, 2010 CAP Congress, Toronto, ON, June 7-11.
40. N. Tabatabaei and A. Mandelis, "Thermal-wave radar: A novel subsurface imaging modality with extended depth-resolution dynamic range", paper 515, 2010 CAP Congress, Toronto, ON, June 7-11.
41. A. Mandelis and S. Telenkov, "The photothermoacoustic radar: imaging comparison of pulsed laser and frequency-domain modalities", paper 502, 2010 CAP Congress, Toronto, ON, June 7-11.
42. A. Hellen, A. Mandelis, Y. Finer and B. Amaechi, "Quantitative Examination of Demineralized and Remineralized Dental Lesions Using Photothermal Radiometry and Modulated Luminescence", paper 506, 2010 CAP Congress, Toronto, ON, June 7-11.
43. A. Mandelis, C.-H. Kwan, A. Matvienko and K. Anosov, "Modulated-Luminescence and Infrared-Photothermal-Radiometry Measured Dynamic Photophysical and Thermophysical Processes in Laser Irradiated Human Cortical Skull Bone", paper 105, 2010 CAP Congress, Toronto, ON, June 7-11.
44. R. Celorrio, E. Apiñaniz, A. Mendioroz, A. Salazar and A. Mandelis, "Improved algorithm to reconstruct the thermal conductivity depth profile in hardened steels", Paper # 032, 10th Int. Conf. on Quantitative InfraRed Thermography, July 27 – 30, 2010, Quebec City, Canada.
45. X. Guo, A. Mandelis, A. Matvienko, K. Sivagurunathan, and B. Zinman, "Wavelength-modulated differential photothermal radiometry for non-Invasive blood glucose detection", Paper # 052, 10th Int. Conf. on Quantitative InfraRed Thermography, July 27 – 30, 2010, Quebec City, Canada.
46. A. Hellen, A. Mandelis, Y. Finer and B. T. Amaechi, "Real-time monitoring of dental lesions using transmission-mode photothermal radiometry and modulated luminescence", Paper # 053, 10th Int. Conf. on Quantitative InfraRed Thermography, July 27 – 30, 2010, Quebec City, Canada.
47. B. Lashkari and A. Mandelis, "Contrast comparison between frequency- and time-domain photoacoustic imaging", Poster Paper # 072, 10th Int. Conf. on Quantitative InfraRed Thermography, July 27 – 30, 2010, Quebec City, Canada.
48. A. Mandelis and J. Tolev, "Free carrier diffusion-wave modulation of a sub-bandgap cw laser beam", Paper # 082, 10th Int. Conf. on Quantitative InfraRed Thermography, July 27 – 30, 2010, Quebec City, Canada.
49. A. Matvienko, A. Mandelis, A. Hellen, R. Jeon, S. H. Abrams and B. T. Amaechi, "Quantitative analysis of dental tissue properties using photothermal radiometry", Poster Paper # 085, 10th Int. Conf. on Quantitative InfraRed Thermography, July 27 – 30, 2010, Quebec City, Canada.
50. N. Tabatabaei, A. Mandelis, and B.T. Amaechi, "Thermophotonic lock-in imaging: An active thermography system for detecting early carious lesions in human teeth", Paper # 134, 10th Int. Conf. on Quantitative InfraRed Thermography, July 27 – 30, 2010, Quebec City, Canada.
51. S. Telenkov and A. Mandelis, "Dual-Mode Photoacoustic Phased-Array Imager for Biomedical Applications", Paper # 136, 10th Int. Conf. on Quantitative InfraRed Thermography, July 27 – 30, 2010, Quebec City, Canada.

52. A. Mandelis, C.-H. Kwan, A. Matvienko and K. Anosov, "Dynamic Photophysical and Thermophysical Processes in Laser Irradiated Human Cortical Skull Bone using Photothermal Radiometry and Modulated Luminescence", 18th Int. Conf. on Advanced Laser Technologies (ALT '10), September 11 – 16, 2010, Amsterdam, Holland.
53. A. Mandelis, A. Hellen, Y. Finer and B. Amaechi, "Quantitative evaluation of simulated human enamel caries kinetics using photothermal radiometry and modulated luminescence", Paper 7883F-129, SPIE BiOS Conf. "Optics in Bone Biology and Diagnostics", Photonics West, January 22, 2011, San Francisco, CA.
54. A. Mandelis, N. Tabatabaei and B. Amaechi, "Thermophotonic lock-in imaging of early demineralized and carious lesions in human teeth", Paper 7884-09, SPIE BiOS Conf. "Lasers in Dentistry", Photonics West, January 23, 2011, San Francisco, CA.
55. S. A. Telenkov and A. Mandelis, "Biophotoacoustic Sonar: Principles of operation, imaging and signal-to-noise analysis in time and frequency domains", Paper 7899-33, SPIE BiOS Conf. "Photons Plus Ultrasound: Imaging and Sensing 2011", Photonics West, January 24, 2011, San Francisco, CA.
56. B. Lashkari and A. Mandelis, "Photoacoustic radar imaging signal-to-noise ratio, contrast, and resolution enhancement using nonlinear chirp modulation", Ontario Photoacoustics Workshop 2010, Estates of Sunnybrook, Sunnybrook Hospital, June 2nd, 2010.
57. Alwi, R., Telenkov S., Mandelis, A., "Biophotoacoustic Radar: Study on Tissue Phantoms, Comparison to Ultrasound Imaging, and Photoacoustic Contrast Agent", MIE Research Symposium, University of Toronto, May 13, 2011 (Poster).
58. Tabatabaei N, Mandelis A, CADIFT Lab, "Photoacoustic & diffusion-wave diagnostic instrumentation and imaging techniques", Canada Research Chairs: Thinking Ahead for a Strong Future, Nov 24-25, 2010, Metro Toronto Convention Centre, Toronto, Canada (Poster).
59. Anna Matvienko, Bennett T. Amaechi, Karthikeyan Ramalingam, Mabel Macaden, Vincent Ye, Alexandra Mandelis, Adam Hellen, Raymond J. Jeon, Koneswaran Sivagurunathan, Andreas Mandelis, Stephen H. Abrams, "PTR-LUM-based detection of demineralization and remineralization of human teeth", 89th IADR meeting, San-Diego, CA, USA, March 16-19, 2011.
60. Stephen H. Abrams, Anna Matvienko, Vincent Ye, Andreas Mandelis, Karthikeyan Ramalingam, Bennett T. Amaechi, "Detection and monitoring of dental erosion using PTR-LUM", 89th IADR meeting, San-Diego, CA, USA, March 16-19, 2011.
61. B. Lashkari and A. Mandelis, "The Biomedical Photoacoustic Radar: A Novel Imaging Method for Breast Cancer Diagnosis", MIE Research Symposium, Medical Sciences Bldg., 1 King's College Road, May 13, 2011.
62. R. Alwi, S. Telenkov and A. Mandelis, "Biophotoacoustic Radar: Study of Tissue Phantoms, Tissues, Nanoparticle Contrast Agents and Comparison to Ultrasound Imaging" MIE Research Symposium, Medical Sciences Bldg., 1 King's College Road, May 13, 2011 (Poster).
63. J. Kim and A. Mandelis, "Detection of Dental Secondary Caries using Frequency-Domain Infrared Photothermal Radiometry (PTR) and Modulated Luminescence (LUM)", MIE Research Symposium, Medical Sciences Bldg., 1 King's College Road, May 13, 2011 (Poster).
64. N. Tabatabaei and A. Mandelis, "Thermophotonic imaging: A novel diagnostic imaging methodology for detecting early caries in human teeth", MIE Research Symposium, Medical Sciences Bldg., 1 King's College Road, May 13, 2011 (Poster).
65. B. Lashkari and A. Mandelis, "Frequency-domain photoacoustic parameter optimization and comparison with pulsed laser photoacoustics", Ontario Biomedical Photoacoustics Workshop 2011, Vaughan Estates, Sunnybrook Health Sciences Centre Campus, Toronto, ON.
66. R. Alwi and A. Mandelis, "Super paramagnetic iron oxide nanoparticles (SPION) as photoacoustic contrast agent", Ontario Biomedical Photoacoustics Workshop 2011, Vaughan Estates, Sunnybrook Health Sciences Centre Campus, Toronto, ON.

67. **(First Prize Winning Poster)** N. Tabatabaei and A. Mandelis, "Thermophotonic Radar Imaging of Turbid Media", Fields-MITACS Conf. on Mathematics of Medical Imaging, University of Toronto, June 20 – 24, 2011.
68. B. Lashkari and A. Mandelis, "Photoacoustic wave generation and signal-to-noise ratio modeling", Fields-MITACS Conf. on Mathematics of Medical Imaging, University of Toronto, June 20 – 24, 2011 (Poster).
69. R. Chirico, M. Frenkel, J. Magee, V. Diky, C. Muzny, A. Kazakov, I. Abdulagatov, G. Hardin, J. Kang, P. Cummings, T. De Loss, J. O' Connell, K. Marsh, P. Brown, A. Goodwin, J. Wu, R. Weir, J. Trusler, A. Padua, W. Haynes, D. Friend, A. Mandelis, V. Rives, C. Schick, S. Vyazovkin, L. Hansen, J. Brennecke and H. Habernickel, "Improving the quality of published experimental data on the basis of a global validation review process", Engineering Applications 2, 19th European Conf. on Thermophysical Properties, Thessaloniki, Greece, August 28 – Sept. 1, 2011.
70. X. Guo , A. Mandelis and B. Zinman, "Wavelength Modulated Differential Photothermal Radiometry (WM-DPTR): theory and experimental applications to glucose detection in water", oral presentation in session "Medical, Dental and Biological Applications", 16th Int. Conf. on Photoacoustic and Photothermal Phenomena (ICPPP), Merida, Mexico, Nov. 27 – Dec. 1, 2011.
71. S. Telenkov, R. Alwi and A. Mandelis, "Frequency-domain photoacoustic imaging using an ultrasonic phased array", oral presentation in session "Instrumentation, Novel Methodologies and Metrology", 16th Int. Conf. on Photoacoustic and Photothermal Phenomena (ICPPP), Merida, Mexico, Nov. 27 – Dec. 1, 2011.
72. S. Kaipilavil and A. Mandelis, "Ultra-deep bone diagnostics with fat-skin overlays using a new pulsed photothermal radar", oral presentation in session "Instrumentation, Novel Methodologies and Metrology", 16th Int. Conf. on Photoacoustic and Photothermal Phenomena (ICPPP), Merida, Mexico, Nov. 27 – Dec. 1, 2011.
73. A. Melnikov, P. Chen, Y. Zhang, A. Mandelis, "Lock-in and Heterodyne Carrierography (CG): Characterization of Industrial Silicon Solar Cells", oral presentation in session "Electronic, Optical Materials, Semiconductors, Thin Films and Devices", 16th Int. Conf. on Photoacoustic and Photothermal Phenomena (ICPPP), Merida, Mexico, Nov. 27 – Dec. 1, 2011.
74. N. Tabatabaei and A. Mandelis, "Thermophotonic Radar Imaging", oral presentation in session "Imaging by Photothermal and Photoacoustic Techniques", 16th Int. Conf. on Photoacoustic and Photothermal Phenomena (ICPPP), Merida, Mexico, Nov. 27 – Dec. 1, 2011.
75. R. Alwi, S. Telenkov, A. Mandelis and F. Gu, "Study of tissue phantoms, tissues, contrast agents with the biophotoacoustic radar and comparison to ultrasound for deep subsurface imaging", poster IV.1 (161657), 16th Int. Conf. on Photoacoustic and Photothermal Phenomena (ICPPP), Merida, Mexico, Nov. 27 – Dec. 1, 2011.
76. B. Lashkari and A. Mandelis, "Comparison between pulsed laser and frequency-domain (photoacoustic radar) modalities: signal-to-noise ratio, contrast, resolution, and maximum depth detectivity", poster XI.12 (161760), 16th Int. Conf. on Photoacoustic and Photothermal Phenomena (ICPPP), Merida, Mexico, Nov. 27 – Dec. 1, 2011.
77. S. Telenkov, R. Alwi and A. Mandelis, "Photoacoustic and ultrasonic image co-registration using a phased array probe and frequency-domain correlation processing", poster XI.13 (161788), 16th Int. Conf. on Photoacoustic and Photothermal Phenomena (ICPPP), Merida, Mexico, Nov. 27 – Dec. 1, 2011.
78. J. Zhang, G. X. Xie, C. H. Wang and A. Mandelis, "Characterization of thermal-wave fields of radially inhomogeneous spherical solids using the Green-function method", poster XVII.1 (161319), 16th Int. Conf. on Photoacoustic and Photothermal Phenomena (ICPPP), Merida, Mexico, Nov. 27 – Dec. 1, 2011.
79. J. Zhang, C. H. Wang and A. Mandelis, "Characterization of thermal-wave field on a 90-degree wedge using the thermal-wave Green-function method", poster XVII.2 (161323), 16th Int. Conf. on Photoacoustic and Photothermal Phenomena (ICPPP), Merida, Mexico, Nov. 27 – Dec. 1, 2011.
80. A. Matvienko, V. Ye, A. Mandelis, S. H. Abrams and B. T. Amaechi, "Study of dental erosion using the PTR-LUM technique", poster XVIII.11 (161665), 16th Int. Conf. on Photoacoustic and Photothermal Phenomena (ICPPP), Merida, Mexico, Nov. 27 – Dec. 1, 2011.

81. J. Kim, A. Mandelis, A. Matvienko, S. H. Abrams and B. T. Amaechi, "Detection of dental secondary caries using frequency-domain infrared photothermal radiometry (PTR) and modulated luminescence (LUM)", poster XVIII-12 (161682), 16th Int. Conf. on Photoacoustic and Photothermal Phenomena (ICPPP), Merida, Mexico, Nov. 27 – Dec. 1, 2011.

VI. BOOKS AND CHAPTERS IN BOOKS

a) Books

1. Editor and co-author of "PHOTOACOUSTIC AND THERMAL WAVE PHENOMENA IN SEMICONDUCTORS". Published by North-Holland Publishing Co., Inc., New York, 1987, ISBN 0-444-01226-5.

Editor-in-Chief of the series "PROGRESS IN PHOTOTHERMAL AND PHOTOACOUSTIC SCIENCE AND TECHNOLOGY", currently published by SPIE Press, Bellingham, WA; (26 - member International Advisory Board); 1991-present.
2. Vol. I: "*Principles and Perspectives of Photothermal and Photoacoustic Phenomena*", Published January 1992, ISBN 0-444-01641-4.
3. Vol. II: "*Non-Destructive Evaluation*", Published by PTR Prentice Hall, Englewood Cliffs, N.J., November 1993, ISBN 0-13-147430-8.
4. Vol. III: "*Life and Earth Sciences*", A. Mandelis and P. Hess, Eds., SPIE Publishing Optical Engineering Press, Bellingham, WA. February 1997, ISBN 0-8194-2450-1.
5. Vol. IV: "*Semiconductors, Electronic and Optical Materials*", A. Mandelis and P. Hess, Eds., SPIE Publishing, Optical Engineering Press, Bellingham, WA January 2000. ISBN 0-8194-3506-6
6. **(Invited Authorship)**: A Mandelis and C. Christofides "PHYSICS, CHEMISTRY AND TECHNOLOGY OF SOLID-STATE GAS SENSOR DEVICES", Chem. Anal. Series Vol. **125** (J.D. Winefordner, Ed.) J. Wiley, New York, Sept. 1993, 323 + xxiii ISBN 0-4771-55885-0.
7. Guest Editor of Ferroelectrics, Vol. **165**, Numbers 1-2 (1995); Special Issue on "Photopyroelectric Spectroscopy and Detection (PPES)", Published April 1995 by Gordon and Breach Publishers, Amsterdam.
8. Special Issue Co-Editor (with K. Michaelian), SPIE Optical Engineering "SPECIAL SECTION ON PHOTOACOUSTIC AND PHOTOTHERMAL SCIENCE AND ENGINEERING", Vol. **36** (2), February 1997.
9. A. Mandelis, "DIFFUSION-WAVE FIELDS: MATHEMATICAL METHODS AND GREEN FUNCTIONS", Springer-Verlag, New York, June 2001; 741 + xii pages 174 figs. ISBN 0-387-95149-0.
10. Edited the Proceedings of the 12th International Conference on Photoacoustic and Photothermal Phenomena, 24-27 June 2002, Toronto, ON, Canada; published in Review of Scientific Instruments Vol. **74**, Number 1, January 2003, Part II: 629 pages, 205 papers.
11. A. Mandelis (Editor and author), "Optics in Bone Biology and Diagnostics", Proc. SPIE Conf. **7166**, 15 June 2009, SPIE Society of Photo-Optical Instrumentation Engineering, ISBN 10: 0819474126.
12. A. Mandelis et al. (Editors), Proc. SPIE Society of Photo-Optical Instrumentation Engineering, "Photonic Therapeutics and Diagnostics VI", 23 – 25 Jan. 2010, San Francisco, CA, USA, Vol. **7548** (SPIE Press, April 2010).
13. A. Mandelis et al. (Editors), Proc. SPIE Society of Photo-Optical Instrumentation Engineering, "Photonic Therapeutics and Diagnostics VII", 23 – 25 Jan. 2011, San Francisco, CA, USA, Vol. **7883** (SPIE Press, February 2011).

b) Chapters in Books

1. A. Mandelis and J.F. Zuccon, "Experimental and Theoretical Aspects of Frequency-Domain Photopyroelectric Spectroscopy of Condensed Phases (PPES); A new and powerful spectroscopic technique", in ADVANCES IN MATERIALS CHARACTERIZATION II; Materials Science Research, Vol. 19; R.L. Snyder, R.A. Condrate, Sr., and P.F. Johnson, Eds. Plenum Press, New York, 1985: pp. 279-291.
2. A. Mandelis, "Photoacoustic Measurements of Physical Processes in CdS" in PHOTOACOUSTIC AND THERMAL WAVE PHENOMENA IN SEMICONDUCTORS; A. Mandelis, Ed., North-Holland Publ. Co., Inc., New York, 1987, Ch. 15.
3. H. Coufal and A. Mandelis, "Photopyroelectric Spectroscopy of Semiconductors", in PHOTOACOUSTIC AND THERMAL WAVE PHENOMENA IN SEMICONDUCTORS; A. Mandelis, Ed., North-Holland Publ. Co., Inc. New York, 1987, Ch. 7.
4. R. Wagner and A. Mandelis, "Photothermal Deflection Spectroscopy (PDS): A Quantitative Characterization Tool of Optoelectronic Energy Conversion Processes at Semiconductor/Electrolyte Interfaces", in PHOTOACOUSTIC AND THERMAL WAVE PHENOMENA IN SEMICONDUCTORS; A. Mandelis, Ed., North-Holland Publ. Co., Inc., New York, 1987, Ch. 14.
5. **(Invited Contribution):** A. Mandelis, "Photothermal Characterization of Electrochemical Systems", in PHOTOTHERMAL INVESTIGATIONS OF SOLIDS AND FLUIDS; J. Sell, Ed., Academic Press, Inc., Orlando, Fla., 1989, Ch. 9., pp. 269-308.
6. **(Invited Contribution)** A. Mandelis, "Frequency-Modulated Time-Delay-Domain Photothermal Spectrometry: Principles, Instrumentation and Applications to Solids", in TOPICS IN CURRENT PHYSICS Vol. 47; P. Hess, Ed., Springer-Verlag, Heidelberg, FRG, 1990, Ch.8.
7. M. Munidasa and A. Mandelis, "Photothermal Imaging and Microscopy" in PHOTOTHERMAL AND PHOTOACOUSTIC SCIENCE AND TECHNOLOGY, Vol. I (A. Mandelis, Ed.) pp. 300-358 (1992).
8. **(Invited Contributions)** A. Mandelis, "Photothermal/Photoacoustic Spectroscopic Measurements of Optical Absorption Coefficients in Semiconductors", HANDBOOK OF OPTICAL CONSTANTS OF SOLIDS III; E.D. Palik, Ed., Academic Press, Inc., San Diego, CA , Vol III, pp. 59-97, (1997).
14. **(Invited Contribution)** A. Mandelis, A. Budiman and M. Vargas, "Photothermal Deep-Level Transient Spectroscopy of Impurities and Defects in Semiconductors" in ANNEALING KINETICS OF DEFECTS IN ION-IMPLANTED SEMICONDUCTORS, Semiconductors and Semimetals, Vol. 46, (R.K. Willardson and A.C. Beer, Eds), pp. 179-211 (1997).
15. **(Invited Contribution)** A. Matvienko and A. Mandelis, "Photopyroelectric Thermal Wave Cavity Devices – 10 years later", in "Pyroelectric Materials and Sensors, 2007", (D. Ramiens, Ed., Research Signpost, Kerala, India, 2007), ISBN81-308-0095-0 (37 pages).
16. **(Invited Contribution)** Y. Liu and A. Mandelis, "Laser Optical and Photothermal Thermometry of Solids and Thin Films", Chap. 7, pp. 297 – 336, in *Radiometric Temperature Measurements I. Fundamentals*; Z. Zhang, B.K. Tsai and Z. Machin, Eds., Vol. 42 Elsevier / Academic Press Series: Experimental Methods in the Physical Sciences, ISBN: 978-0-12-374021-2 (2010).
17. J. A. Garcia, A. Mandelis, S. Abrams and A. Matvienko, "Photothermal Radiometry and Modulated Luminescence: Applications to Dental Caries Detection," in "*Handbook of Biophotonics, Vol. 2: Photonics for Health Care*", Jürgen Popp, Valery V. Tuchin, Arthur Chiou, and Stefan H. Heinemann (Eds.), Wiley-VCH, December 2011, Chap. 71, pp. 1047 – 1051.

1. "A Thermal Wave Sub-Surface Defect Imaging and Tomography Apparatus", *Inventors*: A. Mandelis and M. Mieszkowski. U.S. Patent Office, Washington, D.C. Patent Number: 4, 950, 897; Date: August 21, 1990.
2. "Non-Contact Method for Measuring Thermal Diffusivity of Solids", *Inventors*: A Mandelis, and M. Munidasa, U.S. Patent Office, Washington, D.C., Patent Number: 5,667,700; Date: Sept. 16, 1997.
3. "Thermal-Wave Pyroelectric Thin-Film Hydrogen Sensor", *Inventors*: L. Dorojkine, A. Mandelis *et al.*, Russian Patent No. 2092823, October 10, 1997.
4. "Non-Contact Photothermal Method for Measuring Thermal Diffusivity and Electronic Defect", A. Mandelis, M. Munidasa and D. Wolff, Canadian Patent No. 2,126,481; Date: June 6, 2000.
5. "Non-Contact Photothermal Radiometric Metrologies and Instrumentation for Characterization of Semiconductor Wafers, Devices and Non-Electronic Materials", *Inventors*: A. Mandelis, J. Garcia, L. Nicolaidis, M. Rodriguez and S. Paoloni, (US patent, filed Mar. 2000).
6. "Method and Apparatus for Detection of Defects in Teeth", *Inventors*: A. Mandelis, S. H. Abrams, L. Nicolaidis and J. A. Garcia-Hercules, US and Canadian patents filed July 28, 2000; US Patent 6,584,341 B1; Date: June 24, 2003.
7. "Device and method for differential sensing of hydrogen gas using thermoabsorptance or thermoreflectance", *Inventors*: A. Mandelis, C. Wang and J. Garcia, US Patent No. 7,116,421; Date: October 3, 2006.
8. "Method of Photo-Carrier Radiometry of Semiconductors", *Inventors*: A. Mandelis, J. Batista, D. Shaughnessy, and J. Garcia, US patent 7,045,786 B2; Date: May 16, 2006.
9. "Laser Photo-Thermo-Acoustic Imaging Frequency-Swept Heterodyne Lock-in Instrumentation for Industrial and Biomedical Materials", *Inventors*: A. Mandelis, A. Vitkin, S. Telenkov and Y. Fan,; US patent 7,525,661 B2, Issued: April 28, 2009.
10. "Simultaneous frequency-domain infrared photothermal radiometry (PTR) and modulated laser luminescence (LUM) apparatus for diagnostics of defects in teeth", *Inventors*: A. Mandelis, S. Abrams, J.S. Jeon, K. Kulkarni and A. Matvienko, US Provisional patent submitted June 2005.
11. "Method and Apparatus for Detection of Defects in Teeth", *Inventors*: A. Mandelis, S. H. Abrams, L. Nicolaidis, J. A. Garcia-Hercules, Canadian Patent 2,314,691, issued 2011/04/26.
12. "Non-invasive Biothermophotonic Sensor for Blood Glucose Monitoring ", *Inventors*: A. Mandelis and S. Telenkov, US patent 7,729,734 issued April 20, 2010.
13. "Non-contact method and apparatus for hardness case depth monitoring ", *Inventors*: Chin-hua Wang, Jose Garcia and Andreas Mandelis, US patent 7,712,955 B2, issued May 11, 2010.
14. "Method and Apparatus using Infrared Photothermal Radiometry (PTR) and Modulated Luminescence (LUM) for Diagnostics of Defects in Teeth", *Inventors*: A. Mandelis, S. Abrams, R. Jeon, A. Matvienko and G. Kulkarni, PCT Patent Application # PCT/CA2006/001171 submitted May 18, 2006.
15. "Optical Thermometer for Remote Temperature and Thickness Measurements of Thin Coatings on Stationary and Rotating Heated Solid Substrates", *Inventors*: A. Mandelis, Y. Liu, M. Choy and C-H. Wang, US Provisional patent submitted June 2006.
16. "A data acquisition and management system for information acquired by an oral health diagnostic device for monitoring the oral health of humans", *Inventors*: S. Abrams and A. Mandelis, US Provisional patent submitted October 2008.
17. "Non-invasive method and apparatus for diagnostics of early osteoporotic bone loss, density variation and detection", *Inventors*: Andreas Mandelis and Stephen Abrams (US Provisional patent, filed April 2008).
18. "Method of performing wavelength modulated differential photothermal radiometry with high sensitivity", *Inventors*: Andreas Mandelis and Xinxin Guo (US Provisional patent, filed November 2009).

19. "Method of assessing oral health risk" *Inventors*: S. Abrams and A. Mandelis, US patent submitted March 3, 2010.
20. "Method of assessing oral health risk" *Inventors*: S. Abrams and A. Mandelis, PCT (World) patent submitted March 3, 2010.
21. "Method of performing wavelength modulated differential photothermal radiometry with high sensitivity", *Inventors*: Andreas Mandelis and Xinxin Guo (US patent, filed November 17, 2010).
22. "Systems and Methods for Thermophotonic Dynamic Imaging", *Inventors*: Andreas Mandelis, Nima Tabatabaei and Stephen Abrams (US Provisional patent, filed March 2011). International application filed Jan. 20, 2012; Assigned PCT number: PCT/CA2012/050035.
23. "Systems and Methods for Frequency-Domain Photoacoustic Radar Phased-Array Imaging", *Inventors*: Andreas Mandelis, Sergey Telenkov and Bahman Lashkari (US Provisional patent 61/551,261, filed October 25, 2011).
24. "Handpiece with integrated optical system for photothermal radiometry and luminescence measurements", *Inventors*: Jin-Seok Jeon, Andreas Mandelis, Stephen Abrams, Anna Matvienko, Koneswaran Sivagurunathan, Josh Silvertown and Adam Hellen (PCT Patent Application # WO 2011/140664 A2, 17 November 2011).
25. "Method of processing and displaying oral health diagnostic data", *Inventors*: Stephen Abrams, Koneswaran Sivagurunathan, Josh Silvertown, Jin-Seok Jeon and Andreas Mandelis (PCT Patent Application # WO 2011/140663 A1, 17 November 2011).

VIII-a. UNDERGRADUATE COURSES TAUGHT IN THE PAST 5 YEARS

| Course Code | Lects. (hr/wk) | Labs (hr/wk) | Tuts. (hr/wk) | Course Title | Term Taught and Number of Students (in parentheses) |
|---|----------------|--------------|---------------|----------------------|---|
| MIE233S | 3 | | 1.5 | Applied Science | Spring 2002 (175), Spring 2003 (237) |
| MIE496Y | 2 | - | - | Undergraduate Thesis | Fall and Spring 2002 (25) |
| <i>2003-2004: Sabbatical Research Leave</i> | | | | | |
| MIE230H1F | 3 | - | 1.5 | Engineering Analysis | Fall 2005 (145), Fall 2006 (90/180-coordinator) Fall 2007 (86/176-coordinator) |
| MIE333H1F | 3 | - | 1.5 | Engineering Physics | Fall 2005 (125), Fall 2006 (133), Fall 2007 (90/180-coordinator) Spring 2009 (107 and 100 students, 2 sections) Spring 2010 (103 and 100 students, 2 sections) |

VIII-b. GRADUATE COURSES TAUGHT IN THE PAST 5 YEARS

| | | | | | |
|-----------|---|---|---|--|--|
| MIE1801S | 2 | - | - | Engineering Analysis III | Spring 2002 (15), Spring 2003 (7), Spring 2005 (5). |
| MIE1126SM | 2 | - | - | Diffusion-Wave Fields | Summer 2003 (5) |
| MIE1357SM | 2 | - | - | Laser Biomedical Photoacoustics, Biothermophotonics and Imaging | Summer 2006 (4) |
| MIE 1127S | 2 | | | Engineering applications of sound, | Spring 2008 (7) (Course co-developer, coordinator and |

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| | | | | electromagnetic, thermal and photonic waves | Guest Lecturer) |
| MIE1801SM | 4 | - | - | Engineering Analysis III | Summer 2009 (3) |
| MIE1801S | 2 | - | - | Engineering Analysis III | Spring 2010 (4) |
| MIE 1127S | 2 | | | Engineering applications of sound, electromagnetic, thermal and photonic waves | Spring 2010 (6) (Course coordinator and Guest Lecturer) |

IX. SUPERVISION OF HIGHLY QUALIFIED PERSONNEL

X. A. Graduate Students, Post-Doctoral Fellows, Research Associates and Visiting Scientists

| Name | Type of Training and Status | Years supervised/ co-supervised | Title of Project or Thesis | Present Position |
|-------------------------------------|--|---------------------------------|--|--|
| (1) Dodgson, James | M. A. Sc. Thesis | 1983 - 84 | Correlation photoacoustic spectroscopy of solids | Engineer, Toronto Transit Commission, Toronto, ON |
| (2) Zuccon, John | M. A. Sc. Thesis | 1983 - 85 | High-frequency differential piezoelectric photothermal technique using beam position modulation | Director, Professional Affairs, Association of Professional Engineers of Ontario (APEO), Toronto, ON |
| (3) Siu, Edwin, K.M. | M. A. Sc. Thesis | 1983 - 85 | Electronic transport phenomena in n-CdS single crystals | Instrumentation scientist, Onset Electrooptics, Taipei, Taiwan R.O.C. |
| (4) Wagner, Robert E. | M. A. Sc. Thesis | 1986 - 88 | A photothermal spectroscopy study of CdS/polysulfide photoelectrochemical cells | Software Engineer, OPG Canada, Toronto, ON |
| (5) Leung, Kwan | M. A. Sc. Thesis | 1987 - 89 | Laser thermal-wave interferometry | Automotive engineer, Windsor, ON |
| (6) Dr. Power, Joan | Post-Doctoral Fellow | 1986 - 88 | Photopyroelectric multi-frequency spectrometry of solids | Associate Professor, Dept. of Chemistry, McGill University, PQ |
| (7) Vitkin, Alex | M. A. Sc. Thesis | 1988 - 89 | Laser Thermoreflectance Non-destructive Evaluation of Semiconductors and High-Tc Superconductors | Associate Professor, Dept. of Medical Biophysics, University of Toronto, ON |
| (8) Ward, A. A. | M. Eng. Research Project (Mature student) | 1987 - 88 | Laser thermoreflectance of silicon p-n junctions | Retired process engineer, Toronto, ON |
| (9) Dr. Boroumand-Moser Farnaz | Ph.D. Thesis (co-supervised with Dept. of Chemistry, EPFL) | 1988 - 91 | Photopyroelectric Fourier Transform Infrared Spectroscopy of Powders | Chemical Engineer / Research Associate at Ecole Polytechnique Federale de Lausanne (EPFL), SWITZERLAND |
| (10) Dr. Mieszkowski, Marek R. | Post-Doctoral Fellow | 1988 - 89 | Photopyroelectric scanning imaging instrumentation and measurements | President, Digital Recordings, Halifax, NS; and Adjunct Professor, Dalhousie University, NS |
| (11) Dr. Christofides, Constantinos | Post-Doctoral Fellow / Research Associate | 1988 - 92 | Photothermal Hydrogen Sensors | Professor, Dept. of Physics, University of Cyprus, Nicosia, CYPRUS |
| (12) Zhao, Wang | Visiting Scientist | 1987 | Thermal-Wave Tomography | Nanjing University, Key State Lab. Modern |

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|---------------------------------------|--|-----------|--|---|
| | | | | Acoustics, Nanjing, CHINA |
| (13) Dr. Peralta, Samuel | Post-Doctoral Fellow | 1988 - 91 | Photothermal Inverse Problems (Depth Profilometry) | CEO, Qvadis (IT Company), Toronto, ON |
| (14) Duncan, Anne | M. A. Sc. Thesis (co-supervised with Metallurgy & Materials Science Dept., UofT) | 1989 - 90 | Corrosion Monitoring in Microelectronics using Photothermal Beam Deflection Techniques | Unknown |
| (15) Dr. Wagner, Robert E. | Ph.D. Thesis | 1989 - 94 | Quantitative Photomodulated Optical Reflectance of Silicon and Germanium | Software Engineer, OPG Canada, Toronto, ON |
| (16) Dr. Munidasa Mahendra | Post-Doctoral/Research Associate | 1989 - 97 | Thermal-Wave Imaging, Non-Destructive Evaluation, Sensors, Inverse Problems | Sensor Scientist, Metso Automation, Richmond Hill, ON |
| (17) Dr. Chen, Zhuo-hui | Post-Doctoral Fellow | 1989 - 92 | Non-contact laser photothermal deep-level transient spectroscopy of semiconductors | R&D Scientist, Nortel, Ottawa, ON |
| (18) Da Silva Alison | M.A.Sc. Thesis | 1990 - 93 | “Photopyroelectric Spectroscopy of Multiple Quantum Wells” | Unknown |
| (19) Bleiss Ronald | Visiting Industrial Research Scientist, Carl Zeiss, Germany | 1992 - 94 | Infrared Radiometric Deep Level Transient Spectroscopy of Semiconductors | Technical Manager, Jenoptik Technologie GmbH, Jena, GERMANY |
| (20) Dr. Fang, Songru | Visiting Professor, Nanjing University | 1991 | Theoretical studies in thermal-wave tomographic imaging | Unknown |
| (21) Dr. Pade Offer | Visiting Scientist, Rafael, Israel | 1991 - 92 | Computational aspects of thermal-wave tomography | Senior Scientist, Aerodynamic Group, Rafael, Haifa, Israel |
| (22) Dr. Ma, Tian-Chi | Visiting Professor, Tongji University, Director Ultrasonics Lab., Institute of Acoustics | 1991 - 92 | Thermal-wave inverse problem using laser photoacoustics | Tonji University, Director Ultrasonics Lab., Institute of Acoustics, CHINA |
| (23) Dr. Buddhudu, Srinivasa | Visiting Scholar, Univ. Tirupati, India (NSERC Award) | 1992 - 93 | Optical materials diagnostics using infrared laser radiometry | Faculty, Electrical and Electronic Engineering, Div. Microelectronics, Tirupati Univ., INDIA |
| (24) Dr. Gusev Vitalyi | NSERC International Scientific Exchange Award | 1992 - 93 | Nonlinear thermal-wave physics | Professor, Physics Dept., Univ. du Maine, Le Mans Laval, FRANCE |
| (25) Dr. Vanniasinkam, I. Joseph | Ph. D. Thesis | 1993 - 97 | “Laser Photothermal Investigation of Non-Radiative Sources in Solid-State Laser Materials” | Photonics Engineering Scientist, Tycoelectronics, Santa Clara, CA, USA |
| (26) Komendantova (MacCormack), Elena | M. A. Sc. Thesis | 1993 - 95 | “Infrared Photothermal Radiometry of Aluminum” | Technical Sales Engineer, Ionsystems, Toronto, ON |
| (27) Nicolaidis, Lena | M. A. Sc. Thesis | 1994 - 96 | “Thermal-Wave Tomography” | Production Manager, Therma-Wave, Inc., Fremont, CA, USA |
| (28) Dr. Heimlich Michael | Ph. D. Thesis (co-supervised with Dept. of Chemistry, UofT) | 1992 - 97 | “Photopyroelectric Surface Plasmon Sensors” | Unknown |
| (29) Budiman, Arief | M. A. Sc. Thesis | 1994 - 96 | “Photothermal Deep Level Transient Spectroscopy” | Assistant Professor, Dept. Mechanical & Manufacturing Engineering, Univ. Alberta, Calgary, AB |
| (30) Pun, Larry W. H. | M. Eng. Research Project | 1994 - 95 | Computational studies in environmental photothermal sensors | Unknown |
| (31) Dr. Wagner, | Post-Doctoral Fellow | 1994 - 95 | Laser photoreflectance and | Software Engineer, OPG |

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|------------------------------|---|-------------|--|--|
| Robert | | | thermoreflectance studies of industrial Si wafers | Canada, Toronto, ON |
| (32) Dr. Othonos, Andreas | Visiting scientist, Ontario Laser and Lightwave Research Center, UofT | 1993 - 94 | Novel photothermal beam deflection instrumentation for in-situ laser rod ageing monitoring | Associate Professor, Dept. of Physics, Univ. of Cyprus, Nicosia, CYPRUS |
| (33) Dr. Shen, Jun | Post-Doctoral Fellow | 1993 - 97 | Thermal-wave resonant cavity: development and sensor applications | Research Officer, NRC Integrated Manufacturing Technologies Institute, Western Lab., Vancouver, BC |
| (34) Dr. Wolff, Detlev | Visiting Scholar, DAAG Program, Germany | 1993- 94 | Defect semiconductors photothermal rate-window measurements and theoretical support | Production and Procurement Manager, Jenoptik Laserdiode GmbH, Jena, GERMANY |
| (35) Prescott, Valton | M. Eng. Research Project | 1994 - 95 | “Boxcar Rate-Window Thermophysics” | Instructor, DeVry / RCC Institute, Toronto, ON |
| (36) Dr. Garcia Jose H. | Post-Doctoral Fellow / Research Associate | 1995 - 2001 | Photothermal hydrogen sensor development | Vice-President Engineering, Photo-Thermal Diagnostics, Inc., Toronto, ON |
| (37) Dr. Vargas-Luna, Miguel | Post-Doctoral Fellow (Recipient of Mexican Post-Doctoral Research Fellowship Award) | 1995 | Laser photothermal studies of transport properties of defect semiconductors | Professor, Institute of Physics, Universidad Guanajuato, Leon, MEXICO |
| (38) Dr. Dorodjkine, Leonid | Visiting Scientist, N. S. Kurnakov Institute, Russia; recipient of NSERC Visiting Award | 1995 | Thin-film hydrogen sensor development | Research Scientist, Dept. Chemistry, N. S. Kurnakov Inst., Russian Academy of Sciences, Moscow, RUSSIA |
| (39) Dr. Salnick, Alex | Post-Doctoral Fellow; Recipient of NSERC / NATO Award | 1995 - 96 | Photothermal radiometry of semiconductors | Research Scientist, Thermo-Wave, Inc., Fremont, CA, USA |
| (40) Nestoros, Marios | M. Sc. Thesis (co-supervised with Dept. Natural Sciences, Univ. of Cyprus) | 1994 - 96 | Infrared laser photothermal radiometry of doped silicon | Biomedical technical officer, Nicosia General Hospital, CYPRUS |
| (41) Poulli, Zena | M. Sc. Thesis (co-supervised with Dept. Natural Sciences, Univ. of Cyprus) | 1995 - 96 | Laser photothermal studies of ion-implanted silicon | Unknown |
| (42) Dr. Nicolaides Lena | Ph. D. Thesis | 1997 - 2000 | “Thermal-Wave Inverse Problems: Depth Profilometry of Hardened Steels and Diffraction Tomography of Sub-surface Defects in Metals” | Production Manager, Thermo-Wave, Inc., Fremont, CA, USA |
| (43) Dr. Wang, Chin-Hua | Ph. D. Thesis | 1997 - 2000 | “Laser-Induced Purely Thermal Wave Interferometry using a Novel Photopyroelectric Instrument” | Post-Doctoral Fellow, CADIFT, UofT |
| (44) Elek, Francis | M. A. Sc. Thesis | 1997 – 99 | “An Investigation of Photothermal Radiometric Thermal Diffusivity Measurements of Thin Steel Samples” | Ph.D. thesis, Dept. Electrical and Computer Engineering, UofT |
| (45) Dr. Ikari, Tetsuo | Visiting Professor, recipient NSERC / JAPAN Society for Promotion of Science Award | 1997 - 98 | Photothermal spectroscopy of semiconductors | Professor, Dept. Electrical & Electronic Engineering, Miyazaki Univ., Miyazaki, JAPAN |
| (46) Dr. Rodriguez, Mario | Post-Doctoral Fellow (Recipient of Mexican Post- | 1998 - 2000 | Transport phenomena in crystalline and percolative | Professor, Fisica Aplicada y Tecnologia Avanzada, Inst. |

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| | Doctoral Research Fellowship Award) | | semiconductors | of Physics UNAM, MEXICO |
| (47) Dr. Pan Guang | Post-Doctoral Fellow | 1997 - 1999 | Thermodynamics with thermal-wave cavities | Senior Scientist, Microbridge Technologies, Montreal, QC |
| (48) Li Li | M. A. Sc. Thesis | 1998 - 2001 | Infrared Friction Instrumentation | Unknown |
| (49) Eccles Chris | M. Eng. Research Project | 1998 - 99 | “Design and Development of an Infrared Interferometry Friction Measuring Device for Space Station Applications” | Unknown |
| (50) Shaughnessy, Derrick | M. A. Sc. Thesis | 1999 - 2001 | “Carrier Density-Wave Depth Profilometric Measurements in Semiconductor Si Wafers using Laser Infrared Photothermal Radiometry” | Ph. D. student, CADIFT |
| (51) Dr. Rabago, Felipe | Visiting Scientist; Recipient of Mexican Research Award | 2000 - 2001 | Common-mode rejection demodulation technique with applications to high-resolution ion-implantation monitoring in Si wafers | Professor, Dept. of Physics, Universidad Autonoma de San Luis Potosi, San Luis Potosi, MEXICO |
| (52) Dr. Balderas, Abraham | Post-Doctoral Fellow, on leave from CICATA-IPN, Mexico; recipient of Mexican Post-Doctoral Research Fellowship Award | 1999 - 2002 | Photoacoustic and photothermal techniques and measurements of thermophysical properties of liquids and solids | Professor, Dept. Matemáticas, Unidad Profesional Interdisciplinaria de Biotecnología del IPN (UPIBI – IPN), Mexico City, MEXICO |
| (53) Liu, Yue | M. A. Sc. Thesis | 2000 - 02 | “Thermal-Wave Depth Profilometry of Heat-Treated Steels” | Ph.D. Candidate, CADIFT |
| (54) Dr. Wang, Chin-hua | Post-Doctoral Fellow, NSERC PDF Award; and Post-Doctoral Fellow | 2000– 01 2003 - 06 | Carrier-density-wave depth profilometric imaging in electronic solids | Post-Doctoral Fellow, CADIFT, UofT |
| (55) Dr. Baddour, Natalie | Post-Doctoral Fellow | 2001 - 04 | Case-depth non-destructive evaluation in hardened industrial steels | Chevening Technology Enterprise, UK |
| (56) Dr. Shaughnessy, Derrick | Ph. D. Thesis | 2002 - 05 | “Photo-Carrier Radiometry of Industrial Si Wafers” | Staff Scientist, Thermo-Wave, Inc., Fremont, CA |
| (57) Dr. Jeon, Raymond | Research Associate | 2002 - present | Dental Biothermophotonics | |
| (58) Dr. Batista, Jerias | Post-Doctoral Fellow, on leave from Universidade Federal Maranhao Centro Tecnológico, Dept. Physics, Sao Luis, Brazil; recipient of PDF Award by Government of Brazil | 2002 - 04 | Photo-Carrier Radiometry of Semiconductors: experimental and computational studies | Associate Professor, Universidade Federal Maranhao Centro Tecnológico, Dept. Physics, Sao Luis, BRAZIL |
| (59) Dr. Liu, Yue | Ph. D. Thesis | 2002 - 05 | Optical thermometer development for industrial applications | Post-Doctoral Fellow, CADIFT |
| (60) Dr. Liu, Yue | Post-Doctoral Fellow | 2005 – December 06 | Optical thermometer development for industrial applications | |
| (61) Dr. Guo, Xinxin | Post-Doctoral Fellow | 2001 - 02 | Photothermal diagnostics of glucose in biofluids | Research Scientist, Photo-Thermal Diagnostics, Inc., Toronto, ON |
| (62) Xie Ming | Visiting Technologist (funded by Shanxi Province, China) | 2002 | Thermal-wave resonant cavity design for fluid measurements | Unknown |
| (63) Dr. Matvienko, Anna | Ph. D. Thesis | 2003 – 06 | Ultra-high resolution fluid mixture thermophysics using a | Post-Doctoral Fellow, CADIFT |

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| | | 2009 - | thermal-wave cavity | |
| (64) Dr. Matvienko, Anna | Post-Doctoral Fellow | 2006 - | Dental Thermophotonics | |
| (65) Choi, Mervyn | M. Eng. Research Project | 2004 | Optical thermometer: applications to ultrathin thermal coatings | Unknown |
| (66) Spirou, Gloria | M. Sc. (co-supervised with Dept. Medical Biophysics, UofT) | 2003 - 05 | “Photothermoacoustic imaging of thermal lesions” | Ph.D. student, McMaster University |
| (67) Dr. Fan, Ying | Post-Doctoral Fellow | 2002 - 04 | Frequency-domain Photo-thermoacoustic imaging instrumentation for breast cancer applications | Research Scientist, General Electric Research Labs., Albany, NY, USA |
| (68) Dr. Fukuyama, Atsuhiko | Research leave (funded by Dept. of Electrical & Electronic Engineering, Miyazaki University, Miyazaki, Japan) | 2003 | Comparison of laser infrared photo-thermal and photo-carrier techniques for transport property measurements in Si wafers | Research Associate Professor, Dept. Electrical & Electronic Engineering, Miyazaki University, Miyazaki, JAPAN |
| (69) Dr. Kumar, Shaikhendra | Visiting scientist, on leave from Centre for Advanced Technologies, Indore, India | 2002 | Surface photovoltage of depletion layers in oxide semiconductors | Scientific Officer, Centre for Advanced Technologies, Indore, INDIA |
| (70) Dr. Li, Bincheng | Post-Doctoral Fellow | 2002 - 04 | Photo-Carrier Radiometry of Semiconductors and Photothermal depth profilometry of treated ceramics | Research Professor, Institute of Optics and Electronics, Dept. Thin Film Optics, Chinese Academy of Sciences, Chengdu, Sichuan, CHINA |
| (71) Dr. Tolev, Jordan | Research Associate | 2004 - | Photo-Carrier Radiometry of Ion-Implanted Si; general laboratory supervisor | |
| (72) Dr. Telenkov, Sergey | Post-Doctoral Fellow / Research Scientist | 2004 - 2005 | Frequency-Domain chirp heterodyne photo-thermo-acoustic methodology for cancerous lesion imaging in turbid tissue. | Research Scientist, Imaging Diagnostic Systems, Inc. Plantation, FL, USA. |
| (73) Xia Jun | M. A. Sc. Thesis | 2004 - 2006 | Deep-Level Thermal Spectroscopy of Semiconductors | Ph.D. student, CADIFT |
| (74) Girard, Sebastien | Visiting French graduate student (EU Overseas Research Award Recipient) | 2004 - 2005 | High-resolution photo-carrier radiometry of silicon-on-insulator (SOI) structures | |
| (75) Dr. Mario E. Rodriguez Garcia | Visiting Professor, Centro de Fisica Aplicada y Tecnologia Avanzada UNAM, Queretaro, Mexico | 06 - 07/2005 | Photo-carrier radiometry of ultra-shallow junctions in Si | |
| (76) Dr. Xia Jun | Ph. D.. Thesis student | 2006 - 2010 | “Development of deep-level photothermal spectroscopy and photo-carrier radiometry for the characterization of semi-insulating gallium arsenide” | Post-doctoral fellow with Prof. Lihong Wang, Biophotonic Imaging, Univ. of Washington |
| (77) Dr. Yangdong Hu | Post-Doctoral Fellow | 2006 | Photothermal microfluidics | Unknown |
| (78) Dr. Bahman Lashkari | Ph. D.. Thesis | 2006 - | Biophotoacoustic Imaging | Ph.D. student, CADIFT |
| (79) Pawlak, Michal | (co-supervised Ph.D. student from Ruhr University, Bochum, Germany) | 2004 - 2008 | Non-linear phenomena in photocarrier radiometry dependence on resistivity of Si wafers | MIE visitor, Jan. – Apr. 06; and October 2007 – April 2008 |
| (80) Leong, Keith | Ph.D. Thesis student (ECE; co-supervised) | 2005 | Intrinsic Amorphous-Crystalline Silicon Heterostructure Characterization | Jan. 05 - |

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| (81) Thao Phan | (co-supervised with Prof. Kiran Kulkarni, DENT) M.D.Sc. (DENT) | Oct. 03 – Aug. 2006 | Dental Diagnostics with Photothermal Radiometry and Luminescence | Practising dentist |
| (82) Dr. Guo, Xinxin | Research Associate | 2007 - | Industrial steels case depth hardness photothermal radiometric instrumentation | Research Associate, CADIFT |
| (83) Tabatabaei Nima | Ph.D. Thesis student | 2007 - | Thermal-wave radar and lock-in infrared camera imaging for non-destructive evaluation | |
| (84) Dr. Jose Garcia | Part-time Research Associate | 2006 - 2010 | Early dental caries diagnostic instrumentation. | Cross-appointed to Quantum Dental Technologies, Inc., VP Engineering |
| (85) Professor Mario E. Rodriguez Garcia | Visiting Professor | 2007 | Studies in Photocarrier Radiometry of GaSb and Te-doped GaSb heterostructures | Professor, Universidad Nacional Autonoma Mexico, Queretaro, Mexico |
| (86) Garcia-Rivera Jose | Ph.D. Student (UNAM Mexico, co-supervised with Prof. Mario Rodriguez Garcia) | 2006-07 | Photocarrier Radiometry of Ultrathin Junctions in Silicon | |
| (87) Velasquez-Hernandez Roberto | Ph.D. Student (UNAM Mexico, co-supervised with Prof. Mario Rodriguez Garcia) | 2006-07 | Photocarrier Radiometry of Silicon-on Insulator structures | |
| (88) Dr. Koneswaran Sivagurunathan | Post-Doctoral Fellow | 2007- | Dental photothermal radiometric and modulated luminescence instrumentation | Software Engineer, Quantum Dental Technologies, Inc. |
| (89) Adam Hellen | M.Sc. Dept. of Dentistry, UoFT (co-supervised) | May 2007- March 2010 | “Quantitative evaluation of demineralization and remineralization of simulated enamel caries using Photothermal Radiometry and Modulated Luminescence” | |
| (90) Dr. Telenkov, Sergey | Research Associate | March 2008 - | Biomedical Photothermoacoustics | |
| (91) Dr. Alexander Melnikov | Research Associate | October 2008- | Solar Cell Photo-Carrier Radiometry – Industrial steel hardness depth profilometry | |
| (92) Ms. Delia Hurtado | Visiting Graduate Student, UNAM, Mexico | June 1 – Aug. 31, 2008 | Dependence of photo-carrier radiometric signals on crystalline orientation in Si wafers. | |
| (93) Dr. Pavlo Martinez-Torres | Visiting Scientist, Conacyt, Mexico | Nov. 1, 2008 – Apr. 31, 2009 | Study of thermal diffusivity depth profiles of curing resins by laser photothermal radiometry and diffusion-wave inverse-problem methods | Researcher CINVESTAV, Merida, Cancun, Mexico |
| (94) Jungho Kim | MASc Thesis student | May 2009 - | Thermophotonics of dental fillings and cavities | |
| (95) Mohamed Saleh-Lavaee | Volunteer researcher | Feb. – June 2009 | Thermal-wave diagnostics of subsurface defects using complementary signal waveforms | Graduate student, UoFT |
| (96) Rudolph Alfred Alwi | M.A.Sc. student (IBBME) | September 2009 - | Biomedical Photothermoacoustics: phantom and animal studies | |
| (97) Ali K. Oskooei Kazemi | Ph.D. student | May 2010 - Sept. 2010 | Biomedical Photothermoacoustics: multi-transducer array imaging | |

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| | | | instrumentation | |
| (98) Syed Haq | M.Eng. student | Sept. 2009- Aug. 2010 | Lock-in carrierography of solar cells | |
| (99) Dr. Sreekumar Kaiplavil | Post-doctoral Fellow | April 2010 - | Photothermal and photoacoustic instrumentation and analytical methods for very early bone osteoporosis diagnostics | |
| (100) Wei Wang | Ph.D. student | January 2011 -- | Ultrasound-assisted biomedical photoacoustics | |
| (101) Basia Halliop (co-supervised with Prof. N. Kherani, ECE) | Ph.D. student | October 2011 - | Photocarrier radiometry and lock-in carrierography of amorphous Si solar cells | |
| (102) Dr. Hadi Babaei | Post-doctoral Fellow | January–April 2011 | Theoretical modeling of photocarrier radiometry of photovoltaic solar cells | Self-employed engineer |
| (103) Ruben Velasquez | Visiting Ph.D. student, Universita Autonoma de Queretaro, Mexico | August – December 2010 | Case-hardness depth profiles in industrial steels using the thermal-wave radar | Ph.D. student in Universita Autonoma de Queretaro, Mexico |
| (104) Kyle Horne | Visting Ph.D. student, Dept. Mechanical and Aerospace Engn., Utah State University, Logan, Utah | July-August 2010 | Photothermal radiometric measurements of ion-irradiated ZrC | Ph.D. student Dept. Mechanical and Aerospace Engn., Utah State University |
| (105) Prof. Yu Zhang | Associate Professor, Dept. of Electrical Engineering and Automation, Harbin Institute of Technology, Harbin, China | March 2011 – Feb. 2012 | Lock-in and heterodyne carrierographic imaging of solar cells | |

X. B. B.A.Sc. Theses, Undergraduate, High-School, New Immigrant Scientists

| Name | Type of Training / Supervision and Status | Years supervised / co-supervised | Title of Project or Thesis | Present Position |
|-------------------|---|----------------------------------|---|--|
| Andreeta, C. | B. A. Sc. Thesis | 1984 - 85 | Optical sensor applications in Robotics | Unknown |
| Branco, C. M. | B. A. Sc. Thesis | 1984 - 85 | Thermal-wave studies of ion-implanted Silicon wafers | Unknown |
| Care, F. | B. A. Sc. Thesis | 1984 - 85 | Photopyroelectric circuit for the investigation of phase transitions in solids | Unknown |
| Wagner, Robert E. | B. A. Sc. Thesis | 1984 - 85 | Photoelectrochemical studies of CdS single crystalline electrodes using the Mirage effect | Software Engineer, OPG Canada, Toronto, ON |
| Lymer, John D. | Summer research student | 1984 | Thermophysical measurements of fuel cell electrodes | Unknown |
| Macchia, Enzo | B. A. Sc. Thesis | 1983 - 84 | Mechanical stress effects on electronic properties of crystalline silicon | Senior Staff Engineer, Pratt & Whitney Canada, Mississauga, ON |
| Zver, Martin, M. | UG Research Assistant | 1985 | Photopyroelectric Spectroscopy of Solids | Unknown |

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| Burns, James and Leung, Anna | B. A. Sc. Thesis (Joint) | 1985 - 86 | Thermal-wave depth profiling of inhomogeneous solids | Unknown |
| Musing, Andreas N. | B. A. Sc. Thesis | 1985 - 86 | Characterization of several n-type CdS photoelectrochemical cells | Unknown |
| Taylor, Martin | Summer research student | 1985 | Computer-aided theoretical investigation of optically excited solids with inhomogeneous thermal diffusivity | Unknown |
| McKenzie, Timothy | Summer research student | 1986 | Photopyroelectric imager design | Unknown |
| Verdin, Gordon | Summer research student | 1986 | Thermal-wave imaging of subsurface defects in engineering solids | Unknown |
| Gowman, Linda | B. A. Sc. Thesis | 1986 - 87 | Laser photothermal studies of biofluids | Department of Medical Biophysics, University Hospital, University of Western Ontario, London, ON. |
| Nguyen, T. D. | B. A. Sc. Thesis | 1987 - 88 | Laser studies of biomaterials | Unknown |
| Ghandi, K., Baltman, R. Lin, M. | High-School Students (Grade 13) | 1987 - 88 | Faculty of Arts & Sciences Mentorship Program | Unknown |
| Dr. Ghandi, Kamyar | UofT Engineering Science Research Assistant | 1988 - 89 | Photopyroelectric Spectroscopy of Amorphous Si:H Thin Films | MIT Ph.D. in Aerospace Sciences; VP, R&D Continuum Control Corp., Billerica, MA, USA |
| Romano, John | B. A. Sc. Thesis | 1989 - 90 | Photopyroelectric hydrogen detectors | Unknown |
| Ellis, Susan | B. A. Sc. Thesis | 1989 - 90 | Thermal properties of processed aluminum using time-delay spectrometry | Unknown |
| Lo, Andrew | B. A. Sc. Thesis | 1989 - 90 | An extension of Kubelka-Munk theory in reflectance spectroscopy using perturbation analysis | Technical Manager, Schneider Electric, 8 North Dong Sanhuan, Chaoyang District, Beijing, CHINA |
| Ferguson, C. | B. A. Sc. Thesis | 1990 - 91 | Thermal-Wave Tomography of Solids | Unknown |
| Lam, K-S.S. | B. A. Sc. Thesis | 1990 - 91 | Laser non-destructive evaluation of ceramics | Unknown |
| Rabadi, A. | B. A. Sc. Thesis | 1990 - 91 | Thermal-wave imaging of engineering materials | Unknown |
| Gallardo, R. | B. A. Sc. Thesis | 1991 - 92 | Gas laser system construction | Unknown |
| Shrivastava, A. | B. A. Sc. Thesis | 1991 - 92 | Inversion of Laplace Transforms; applications to thermal-wave diffraction tomography | Unknown |
| Ogg Cameron; Ficnar Frank; Rawski Jacob | High-School Students (Grade 13) | 1991 - 92 | Faculty of Arts & Sciences Mentorship Program | Unknown |
| Wong Pauline | High-School Students | 1992 - 93 | Faculty of Arts & | V. Yang: Ph. D. student, |

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|--|--|-------------|--|--|
| Yang, Victor Carbajales, Sebastian Katz, Arrin Damczuk | (Grade 13) | | Sciences Mentorship Program | Dept. Medical Biophysics, UofT; A. Katz: Scientist, NIST Advanced Technology Program (Biochips), NIST MD, USA |
| Chan, Howard Kuperman, Alex Luxat, David Yao, Daniel Kubelnik, Dalibor | High-School Students (Grade 13) | 1993 - 94 | Faculty of Arts & Sciences Mentorship Program | Unknown |
| McAllister, Ken | UTMIE 3 rd Year summer research student | 1994 | Laser photothermal archaeometry of ancient stones from Cyprus | Unknown |
| Thomas, Chris (Marc Garneau C.I.) | High-school co-op student | 1993 - 94 | Ti:Sapphire laser rod manufacturing studies | Unknown |
| Parucha, Joseph (De la Salle College "Oaklands") | High-school co-op student | 1993 - 94 | Thermal-wave tomography | R&D module design engineer, JDS Uniphase Corp. Ottawa, ON |
| Aulicino, Anthony Correia Robert, Devalia, Devan Larsen C. Lee Ogbamichael, Tekle Sit, Shy-Yan | B. A. Sc. Theses | 1994- 95 | Various topics in thermal-wave science and engineering | Unknown |
| Bruscia, Rita Laskarzewska, Barbara Artham, Srinivasan Jain, Lily | High-School Students (Grade 13) | 1994 - 95 | Faculty of Arts & Sciences Mentorship Program | Unknown |
| Persaud, Devindra | B. A. Sc. Thesis | 1995 - 96 | Thermal-wave assessment of coating adhesion | Unknown |
| Ho, Vivien | B. A. Sc. Thesis | 1996 - 97 | Biomedical photoacoustics | Unknown |
| Dummit, Stephen | B. A. Sc. Thesis | 1997 - 98 | Computational simulations of thermal coatings on metals using thermal-wave frequency scans | Unknown |
| Leies, Nick (Humberside C. I.) <i>Marinova, Margarita</i> (Northern Secondary) <i>Ting, Elmer</i> (Brebeuf C.I.) <i>Chen Yan</i> (Jarvis C. I.) | High-school co-op students | 1997 - 98 | Various topics in diffusion-wave sciences | <i>Marinova:</i> Graduate student, Caltech, Pasadena, USA <i>Chen:</i> Engineer, Software QA, Actel Corp., Sunnyvale, CA, USA |
| Lee Billy Martin, Steven C. | B. A. Sc. Theses | 1999 - 2000 | Various topics in diffusion-wave sciences | Unknown |
| <i>Feng, Chris</i> (Western Technical Commercial School) <i>Wong, Pauline</i> (Mary Ward Catholic Secondary) <i>Januszonis, Arvydas</i> (Bishop Allen Academy) <i>Nazareno, Nicholas</i> (Markville Secondary, Markham, ON) | High-school co-op students | 1998 - 99 | Various topics in diffusion-wave sciences | <i>Feng:</i> Graduate student, MIT; <i>Januszonis:</i> Graduate, EECE, UofT |

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|---|---|-------------------------|---|--|
| <i>Vicram Ralh (Mississauga Private School) Nelson, Liz (Jarvis C.I.)</i> | | | | |
| Ng, Jessica, Raghunanan Sita | High-School Students (Grade 13) | 1998 - 99 | Faculty of Arts & Sciences Mentorship Program | <i>Ng:</i> Undergraduate student at Queen's Univ., Kingston, ON |
| Feng, Chris | Engineering Science research assistant; Work-study program, UofT; and NSERC USRA Award | 1999 – 2000 2001 | Computational problems in diffuse photon density wave physics | Graduate student, MIT |
| Chen, Yang | Engineering Science, summer research student; and Work-study program, UofT | 2000 2000 - 01 | Diffusion-wave simulations in solids | Engineer, Software QA, Actel Corp., Sunnyvale, CA, USA |
| Ziman, Robert | High-School Student (Grade 11 Gifted Program) | 1999 - 2000 | Faculty of Arts & Sciences Mentorship Program | Unknown |
| Ip, Tony (Jarvis C. I.) Park, Peter (Woburn C. I.) | High-school co-op students | 1999 - 2000 | Various topics in diffusion-wave sciences | Unknown |
| Dr. Sanchez, Victor | Research Assistant (New Immigrant, Colombia) | 1999 - 2003 | Development of dental histology and diagnostic imaging techniques | Candidate for School of Dentistry, UofT |
| Dr. Chiclov, Serguei | Research Assistant | 2000 - 2001 | Computer software development in CADIFT | Unknown |
| Chahwan, Alain | 2 nd -Year MIE Student; NSERC USRA Award | 2001 | Dental caries diagnostics using laser infrared photothermal radiometry | Unknown |
| Lee, Richie, Moore, Jessica, Premachandran, Thadsan Wei, Dennis Wei, Guowen | High-School Students (Grade 13) | 2000 - 01 | Faculty of Arts & Sciences Mentorship Program | Unknown |
| Chiu, Bernard, McCracken, Mike, Conor, O'Hara, Wong, Samuel, Yeung, Edmond | High-School Students (Grade 13) | 2001 - 02 | Faculty of Arts & Sciences Mentorship Program | Unknown |
| Piatkowski, Nicolas | 2 nd -Year MIE Student; NSERC USRA Award | 2002 | Photothermal imaging of industrial ceramics | 4 th -Year MIE student |
| Yick, Wilson (Northern Secondary) Razl, Chris (Northern Secondary) | High-school co-op students | 2001 - 02 | Various topics in diffusion-wave sciences | <i>Razl:</i> Undergraduate student, Queen's University, Kingston, ON |
| Lo, William, Fung, Peter, | High-School Students (Grade 13) | 2002 - 03 | Faculty of Arts & Sciences Mentorship Program | Unknown |
| Swzedowski, Thomas | 2 nd -Year MIE Student; NSERC USRA Award | 2003 | Computer implementation of frequency-domain photo-carrier radiometry theory | Candidate, Graduate school |
| Wang, Yvonne (Northern Secondary) | High-school co-op student | 2003 | Review of biomedical optoacoustics literature | Engineering Science, UofT |
| Han, Calvin | Work-study program, UofT | 2002 - 03 | Dental Thermophotonics | Graduate student, UBC |

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| Pan, Chun-Po | High-School Student (Grade 12); Faculty of Arts & Sciences Mentorship Program ; Engineering Science Work – Study student | 2003 – 04 2004 - 05 | Software development for scientific literature database construction at CADIFT. Research assistant, industrial steels hardness monitoring using photothermal radiometry | Engineering Science student, UofT |
| Wu, Alice | 2 nd -Year Engineering Science, Biomedical Option; Work-study program and summer research student; Work-study program | 2003 – 04 2004 - 05 | Research Assistant, Dental caries diagnosis using laser photothermal techniques | Graduate student, Dept. of Dentistry, UofT |
| Lau, Christopher | B. A. Sc. Thesis | 2004 - 05 | Software development for technical literature documentation and retrieval | |
| Tiedje, David | B. A. Sc. Thesis | 2004 - 05 | Laser diagnostics of hardness profiles in manufactured steel screws | |
| Yu, R. Haoliang | B. A. Sc. Thesis | 2004 - 05 | Statistical analysis of laser radiometric data obtained by dental lasers from carious human teeth | |
| Najafi-Ashtiani, Payam | B. A. Sc. Thesis | 2004 - 05 | Investigation of the physical properties of a novel optical thermometer | |
| Bernard Lau | 2 nd -Year MIE Student; NSERC USRA Award | May – August 2005 | Photothermoacoustic Imaging of Soft Tissues | |
| Alberto Esteban Gomez | B. A. Sc. Thesis | 2005 - 06 | Applications of lasers to noninvasive detection of caries in human teeth | |
| Gustavo Arvisu | B. A. Sc. Thesis | 2005 - 06 | Quantitative dental caries diagnostics using micro-computed tomography | |
| Ms. Diana Brahaj | New Immigrant Engineer - volunteer | 2006 - 2007 | Thermal-wave cavity design | Unknown |
| Chi-Hang Kwan | 2 rd Year MIE Undergraduate, Summer NSERC USRA | May – August 2006 | Thermodynamic studies of gases using a thermal-wave cavity | 3 rd Year student, MIE |
| Angela Ying Jie Yao | 3 rd Year Eng. Sci. Work-study program | Sept. 2005-March 2006 | Dental photothermal diagnostics | 4 th Year student, Eng.Sci. |
| Lin Lin Yang | William Lyon MacKenzie C.I. Faculty of Arts & Sciences Mentorship Program | Sept. 2005 – May 2006 | Thermal-Wave Cavity measurements of Liquids | |
| Anthony Dos Santos | Michael Power St. Joseph Faculty of Arts & Sciences Mentorship Program | Sept. 2005 – May 2006 | Dental experiments using laser photothermal radiometry | |
| Adam Hellen | 3 rd Year Biology student at Univ. of Western | May – August 2006 | Experimental research on root caries in teeth | 4 th Year student |

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| | Ontario | | | |
| Kehui (Kelly) Yan | Grade 12 student, Jarvis C.I. | Sept. 2006 – May 2007 | Computational tools for thermal-wave cavity theory | |
| Chi-Hang Kwan | 3rd Year MIE Undergraduate, Summer NSERC USRA | May – August 2007 | Photothermal radiometry of animal bones; project on osteoporosis detection | 4 rd Year student, MIE |
| Alejandro Martinez | 3 rd Year MIE Undergraduate, Work-Study Program | October 2006 – March 2007 | Experimental research on artificial caries generation in teeth | 4 th Year student, MIE |
| Minh Doan | Grade 12 student, Delphi Secondary Alternative School | October 2006 – May 2007 | Experimental research on interproximal caries generation in teeth | |
| Chi-Hang Kwan | B.A.Sc. Thesis | 2007 - 08 | Photothermal radiometry and modulated luminescence in osteoporosis detection | 4 rd Year student, MIE |
| Amy Webster | B. A. Sc. Thesis | 2007 - 08 | Photothermal radiometry and modulated luminescence in osteoporosis detection | Exchange student, Univ. of Bristol, UK – Univ. of Toronto |
| Benjamin Tang | B. A. Sc. Thesis | 2007 - 08 | High-pressure photopyroelectric signal generation in air | |
| Michael Forcht | B. A. Sc. Thesis | 2007 - 08 | Photothermoacoustic imaging of tissue phantoms | 4 rd Year student, MIE |
| Ji Ke | Work-study program | 2007 - 08 | High pressure thermophysics using a thermal-wave cavity | 4 rd Year student, MIE |
| Alexander Paizionis | Top 1 st Year Summer Student, Faculty of Applied Science and Engineering, Undergraduate Summer Fellowship winner | May – August 2008 | Photo-carrier techniques to measure silicon resistivity in a non-contact manner | 2 nd Year student, MIE |
| Harguneet Brar | 4th Year MIE Undergraduate, Summer NSERC USRA | May – August 2008 | Thermodynamics of high pressure gases using a thermal-wave cavity | 4 th Year student, MIE |
| Philip Chen | Grade 12 student volunteer | June – July 2008 | Glucose biosensor characterization | UofT; Engineering Science |
| Mauricio Curbello | High-School Student (Grade 12); Faculty of Arts & Sciences Mentorship Program | January – July 2008 | Dental caries statistics through photothermal and luminescence measurements | Bishop Allen Academy, Toronto |
| Nicole Chang | High-School Student (Grade 12); Faculty of Arts & Sciences Mentorship Program | January – May 2008 | Laser inspection of dental defects | Havergal College, Toronto |
| Jane Zhang | High-School Student (Grade 12); Faculty of Arts & Sciences Mentorship Program | January – August 2008 | Hardness case depth instrument design and testing for industrial uses | Branksome Hall, Toronto |
| Philip Chen | Engineering Science student; summer fellowship (ESROP) | May - Aug. 2009 | Photocarrier Imaging of Si Solar Cells | |

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|-------------------------|---|--|--|-----------------------------|
| Mark Mereshensky | B.A.Sc. Thesis | 2008 - 09 | Canary dental detection system (ergonomics) | |
| Mona Amariei-Voiculescu | B.A.Sc. Thesis | 2008 - 09 | Canary dental detection system (hardware) | |
| Rory Chong | B.A.Sc. Thesis | 2008 - 09 | Software design and data optimization of laser thermophotonic instrument for caries diagnosis in human teeth | |
| Nadim Vira | B.A.Sc. Thesis | 2008 - 09 | Laser photothermoacoustic diagnostic tool design for noninvasive imaging of biological tissue (hardware) | |
| Kavita Nayar | B.A.Sc. Thesis | 2008 - 09 | Laser photothermoacoustic diagnostic tool design for noninvasive imaging of biological tissue (software) | |
| Cecilia Chen Liu | Work-study program, MIE 4 th year student | 2008-09 | Photopyroelectric device for high pressure and emissivity thermophysics | |
| Nhan Nguyen | High-School Student (Grade 12); Faculty of Arts & Sciences Mentorship Program | November 2008 – May 2009 | Thermal-wave steel hardness measurements (data acquisition) | Weston Collegiate Institute |
| Kimberely Chen | High-School Student (Grade 12); Faculty of Arts & Sciences Mentorship Program | November 2008 – May 2009 | Thermal-wave steel hardness measurements (data analysis) | Bishop Strachan School |
| Michael Vecchio | High-School Student (Grade 12); Faculty of Arts & Sciences Mentorship Program | November 2008 – May 2009 | Photocarrier radiometry of Si solar cells | Chaminade College School |
| Konstantin Anosov | Work-study program, Physics 3 th year student | November 2008 – May 2009; Sept. 2009 - | Photocarrier radiometry of Si solar cells; photothermal bone diagnostics | |
| Philip Chen | Engineering Science student; summer USRA | January – August 2010 Sept. 2010 – April 2011 | Lock-in Photocarrier Imaging of Si Solar Cells – software development | |
| Kyu Hong Kim | B.A.Sc. Thesis | Sept. 2009 – March 2010 | Laser dental Thermophotonics | |
| Oren Zeev Kraus | B.A.Sc. Thesis | Sept. 2009 – March 2010 | Blood glucose diagnostic instrumentation | |
| Tian Xing Zhu | B.A.Sc. Thesis | Sept. 2009 – March 2010 | Design and testing of thermal-Wave IR emissivity sensor | |
| Ishaan Arora | Work-study program, 3 rd year Arts & Sciences student | October 2009 – March 2010 | Dental enamel erosion studies using PTR/LUM | |
| Konstantin Anosov | Work-study program, Physics 4 th year student | October 2009 – March 2010 | Photothermal measurements of chromophore decay lifetimes in human skull cortical bone | |

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| Albert Hu | Northern Secondary High-School Student (Grade 11); Faculty of Arts & Sciences Mentorship Program | October 2009 – May 2010 | Thermal-wave methods for depth resolution enhancement of photothermal radiometry applications to hardened steels | |
| Romina Abachi | March Garneau C. I. Student (Grade 11); Faculty of Arts & Sciences Mentorship Program | October 2009 – May 2010 | Electrical and optical measurements on silicon multicrystalline solar cells | |
| Askar Kasbekov | Bloor C.I. Student (Grade 11); Faculty of Arts & Sciences Mentorship Program | October 2009 – May 2010 | Photocarrier radiometry of quantum dot solar cells | |
| Cun Wei (Vincent) Ye | Work-study program, MIE undergraduate, 4 th year | October 2010 – March 2011 | Glucose biomonitor | |
| Vahid Amani | Work-study program, MIE undergraduate, 3 rd year | October 2010 – March 2011 | Solar-cell lock-in carrierography imaging | |
| Dora Chu | Work-study program, UofT Biochemistry undergraduate, 2 nd year | October 2010 – March 2011 | Dental thermophotonic imaging | |
| Isaac Lam | B.A.Sc. Thesis | Sept. 2010 – March 2011 | Bone osteoporosis diagnostic instrumentation testing | |
| Marc Pilon | B.A.Sc. Thesis | Sept. 2010 – March 2011 | Analysis of dental clinical trial data using the Canary System | |
| Romina Abachi | March Garneau C. I. Student (Grade 12); Co-op program | January 2011 - present | Design and implementation of an emissivity apparatus for surface chemistry studies | |
| Andres-Salgado Bierman | UofT Schools (Grade 12); Arts & Sciences Mentorship Program | January 2011- May 2011 | Background information collection on Cu and CuO emissivity | |
| Page Franzoi | De la Salle College “Oaklands” (Grade 11); Arts & Sciences Mentorship Program | January 2011- May 2011 | Reaction chamber design for emissivity apparatus for surface chemistry | |

XI. RESEARCH SUPPORT

| Name(s) of Grant/Contract Holder(s) | Support Type, Title of Proposal and Funding Source | Amount per Year \$ | Years of Tenure |
|-------------------------------------|--|--------------------|-----------------|
| Mandelis Andreas | Operating Grant, NSERC | 10,000 | 1982 - 83 |
| Mandelis Andreas | Pure & Applied Sciences Small Grants Competition | 1,000 | 1982 |
| Mandelis Andreas | Research Grant, Atkinson Charitable Foundation | 14,884 | 1982 - 83 |
| Mandelis Andreas | Research Grant, J. P. Bickell Foundation | 21,312 | 1982 |
| Mandelis Andreas | Operating Grant, NSERC | 20,800 | 1983 - 86 |
| Mandelis Andreas | University/Industry NSERC | 91,890 | 1985 - 86 |

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| (with Mitel Semiconductors) | | | |
| Mandelis Andreas | Operating Grant, NSERC | 23,100 | 1986 - 87 |
| Mandelis Andreas | Equipment Grant, NSERC | 54,721 | 1985 - 86 |
| Mandelis Andreas | Operating Grant, NSERC | 23,100 | 1986 - 89 |
| Mandelis Andreas | “R&D of a fast, sensitive pyroelectric sensor for trace H ₂ gas detection”, Energy, Mines and Resources Canada (EMR), Contract | 37,100 | 1986 - 88 |
| Mandelis Andreas | “Opto-Thermal NDE of Materials”, Ontario Laser and Lightwave Research Centre (OLLRC), Ontario Centres of Excellence Program; Contract | 267,350 | 1988 - 91 |
| Mandelis Andreas | “Opto-Thermal NDE of Materials”, OLLRC, Ontario Centres of Excellence Contract (additional equipment) | 126,000 | 01/ 88 – 03/ 88 |
| Mandelis Andreas (PI) and Stephen Thorpe, MMS Dept., UofT | Corrosion in Microelectronics | 42,000 | 1988 - 89 |
| Mandelis Andreas | International Collaborative Grant, NSERC | 6,530 | 1988 - 89 |
| Mandelis Andreas | Operating Grant, NSERC | 26,000 | 1989 - 92 |
| Mandelis Andreas | “R&D of a fast, sensitive pyroelectric sensor for trace H ₂ gas detection – Phases III - IV”, Energy, Mines and Resources Canada (EMR), Contract | 35,000 | 1989 - 91 |
| Mandelis Andreas | “Photomodulation Spectroscopy of Optoelectronic Structures”, OLLRC, Ontario Centres of Excellence Contract | 50,000 | 1992 |
| Mandelis Andreas | Individual Strategic Grant, NSERC | 69,830 (avg/yr) | 1991 - 94 |
| Mandelis Andreas | “R&D of a fast, sensitive pyroelectric sensor for trace H ₂ gas detection – Phase V”, Energy, Mines and Resources Canada (EMR), Contract | 40,000 | 1991 - 92 |
| Mandelis Andreas | “R&D of a fast, sensitive pyroelectric sensor for trace H ₂ gas detection – Phase VI”, Energy, Mines and Resources Canada (EMR), Contract | 38,000 | 04/ 1992 – 03/ 94 |
| Mandelis Andreas | “Nuclear Tube NDE”, Ontario Hydro, Contract | 15,000 | 09/ 91 – 08/ 1992 |
| Mandelis Andreas | Research Grant, NSERC | 26,000 | 1992 - 95 |
| Mandelis Andreas (with Ontario Hydro) | “Photo-thermal Non-Destructive Evaluation of Nuclear Materials”, Manufacturing Research Corporation of Ontario (MRCO), Enabling Contract | 106,000 | 01/ 1993 – 12/ 94 |
| Mandelis Andreas | “Nuclear Tube Photothermal NDE”, Ontario Hydro Contract | 9,000 | 09/ 92 – 08/ 94 |
| Mandelis Andreas | “Thermophysical property measurements of Zr-Nb alloys; Phase I”, Ontario Hydro Contract | 1,000 | 09/ 92 |
| Mandelis Andreas (for Professor Vitalyi Gusev) | International Scientific Exchange Award, NSERC | 12,500 | 08/ 1992 – 02/ 93 |
| Mandelis Andreas | Research Grant, NSERC | 32,400 | 1995 - 99 |
| Mandelis Andreas | “Boxcar Integrator”, Equipment grant, NSERC | 23,400 | 1995 - 96 |
| Mandelis Andreas (PI) and Harry Ruda, MMS dept., UofT | “Photothermal Radiometry of Microelectronic Structures”, Collaborative Grant, NSERC | 101,000 106,318 91,500 | 1994 – 95 1995 – 96 1996 - 97 |
| Mandelis Andreas (for Dr. Leonid Dorojkine) | Foreign Researcher Award, NSERC | 12,900 | 1994 – 95 |
| Mandelis Andreas (for Dr. Alexei Salnick) | Science Fellowship NSERC / NATO | 29,000 29,000 | 1995 – 96 1996 - 97 |
| Mandelis Andreas (with Ontario Hydro) | “Photo-thermal Non-Destructive Evaluation of Materials”, Enabling Contract, MRCO | 125,000 (avg/yr) | 01/ 1995 – 12/ 97 |
| Mandelis Andreas | “R&D of a fast, sensitive pyroelectric sensor for trace H ₂ gas detection – Phase VII”, Energy, Mines and Resources Canada (EMR), Contract | 38,000 | 04/ 1994 – 03/ 96 |
| Mandelis Andreas | “Development of thermal-wave cavity gasoline sensor”, Research Grant, Imperial Oil | 10,000 | 1994 - 96 |
| Mandelis Andreas | “Thermal-wave gasoline sensor technology”, | 20,000 | 01/ 97 – 12/ 97 |

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| (with Imperial Oil, Sarnia, ON) | Collaborative Contract, MRCO | | |
| Mandelis Andreas | “Development of thermal-wave cavity gasoline sensor. Phase II”, Research Grant, Imperial Oil | 10,000 | 1997 |
| Mandelis Andreas, Tom Coyle (MMS; PI), and Chul Park (MIE) | “Rapid Manufacturing”, Enabling Contract, MRCO | 70,000 (10,000: A.M.’s portion) | 04/ 96 – 12/ 97 |
| Mandelis Andreas (with B&W Heat Treating, Kitchener, ON; and Four-Cell Consulting, Toronto, ON) | “Thermal-Wave R&D for Spray Coatings, Steels and Dental Biothermophotonics”, Enabling Contract, Materials and Manufacturing Ontario (MMO) | 150,000 | 01/ 1998 – 09/ 2001 |
| Mandelis Andreas (PI) and Harry Ruda, MMS (with Mitel Semiconductors, Nepean, ON, and Bromont, QC) | “Photothermal Diagnostics for Electronic Materials”, Enabling Contract, MMO | 150,000 | 04/ 1998 – 03/ 2001 |
| Mandelis Andreas (PI) and Rod Tennyson (UTIAS) (with Spar Aerospace) | Research Partnership Support Program, NSERC / CSA | 100,000 107,500 | 1998 – 99 1999 - 2000 |
| Mandelis Andreas (PI) and Rod Tennyson (UTIAS) | Research Contract, Spar Aerospace, Toronto, ON | 57,500 57,500 | 1998 – 99 1999 - 2000 |
| Mandelis Andreas | Research Grant, NSERC | 35,175 | 1999 - 2003 |
| Mandelis Andreas (PI) and Harry Ruda, MMS (with Mitel Semiconductors, Nepean, ON, and Bromont, QC) | Non-Destructive Laser Photothermal Metrologies for Metal, Dental Health & Semiconductor Industries”, Enabling Contract, MMO | 225,000 | 04/ 01 – 03 / 02 |
| Mandelis Andreas (with ATS Spartec, Burlington, ON) | “Infrared Radiometric Investigation of Aspro™-Treated Alumina Ceramics”, Interact Contract, MMO | 14,495 | 2001 |
| Mandelis, Andreas | “Laser Photothermal Detection of Glucose in Tissue-Simulating Phantoms”, Contract, Aris Med, CA, USA | 77,000 | 2001 |
| Mandelis, Andreas (with Sputtek, Inc., Etobicoke, ON) | “Laser Thermoreflectance Temperature Measurements of Coated Ti Alloys”, Interact Contract, MMO | 16,002 | 2001 |
| Mandelis, Andreas (with Sputtek, Inc., Etobicoke, ON) | “Modulated Laser Thermoreflectance (Optical Thermometer) Instrumentation Development for In-Process Remote Temperature Measurements of Thin-Film Deposition”, Collaborative Contract, MMO | 73,170 | 03/ 02 – 02/ 04 |
| Mandelis, Andreas | “Solid-state laser”, Equipment Grant, NSERC | 149,680 | 2002 |
| Mandelis Andreas | Non-Destructive Laser Photothermal Metrologies for Metal, Dental Health & Semiconductor Industries”, Enabling Contract, MMO | 168,750 | 04/ 02 – 12/ 02 |
| Mandelis Andreas (PI) and Alex Vitkin (MBP, UofT) | “Development of a Two-Stage Biomedical Frequency-Domain Photothermoacoustic Methodology for Depth Profilometric Imaging in Turbid Media”, CHRP Grant, NSERC | 142,254 112,400 91,400 | 04/ 02 – 03/ 03 04/ 03 – 03/ 04 04/ 04 – 03/ 05 |
| Mandelis Andreas | “Development of CarrierDensity-Wave Infrared Radiometric Inteferometry and Near-Field Scanning Imaging for Non-Contact Semiconductor Diagnostics”, Discovery Grant, NSERC | 42,500 | 04/ 03 – 03/ 08 |
| Mandelis Andreas (PI) and Kiran Kulkarni (DENT, UofT) (with Four Cell Consulting, Toronto, ON) | “The Development of Laser Radiometric and Luminescence Instrumentation for the Diagnosis and Assessment of Dental Caries”, Collaborative Contract, MMO | 94,787 | 07/ 03 – 06/ 04 |
| Mandelis Andreas | Alexander von Humboldt Research Award | 101,875 (62,500 EU) | 09/ 03 – 04/ 04 |
| Mandelis Andreas (with Photo-Thermal Diagnostics, Inc., Toronto, ON) | “Development of a Non-Contact Infrared Photo-Carrier Radiometry for Si Wafer Process Control”, Collaborative Contract, MMO | 80,000 | 10/ 03 – 09/ 05 |
| Mandelis Andreas (with Metex Heat Treating, Etobicoke, ON) | “Non-contact hardness and case-depth monitoring in industrial steels using laser infrared photothermal radiometry”, Collaborative Contract, MMO | 100,770 | 10/ 03 – 09/ 06 |

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| Mandelis Andreas (PI) and Gajanan (Kiran) Kulkarni (DENT, UofT) (with Four Cell Consulting, Toronto, ON) | “Detection of Interproximal Lesions using Frequency-Domain Photothermal Radiometry and ac Luminescence”, Collaborative Contract, MMO | 91,984 | 07/ 04 – 06/ 05 |
| Mandelis Andreas | « Instrumentation for non-contact non-destructive low-injection imaging of heavy-ion contaminated Si wafers and silicon-on-insulator nanolayer metrology using photo-carrier radiometry”, NSERC RTI | 119,639 | 04/06 – 03/07 |
| Mandelis Andreas | “Optical Thermometer” Ontario Centers of Excellence OCE Market Readiness | 76,410 53,850 | 2005 2006 |
| Mandelis Andreas | “Crack monitoring in Stackpole green and sintered sprockets by non-destructive laser photo-thermal radiometry (PTR)”, OCE Interact Project | 26,000 | 02/06 – 06/06 |
| Mandelis Andreas | “Pre-Clinical Interproximal and Occlusal Caries Detection Prototype using Dental Photothermal Radiometry and Modulated Luminescence”, OCE Market Readiness | 91,349 | 04/06 – 03/07 |
| Mandelis Andreas | “A Prototype Instrument for Non-Contact Hardness and Case-Depth Inspection of Industrial Steels using Laser infrared Photothermal Radiometry”, OCE Market Readiness Project # CM00060 (with Metex Heat Treating Ltd.) | 111,555 | OCE Approved April 2007 May 07 – April 08 |
| Mandelis Andreas (PI) and 7 others | Facility for Advanced Bioacoustophotonics and Biomolecular Microfluidic Photoacoustics CFI / ORF (NIF) | 1,682,421 A.M. portion: 78.5 % Collaborative portion: 21.5% | Sept. 2007 – August 2012 |
| Mandelis Andreas | “Pre-Clinical Interproximal and Occlusal Caries Detection Prototype using Dental Photothermal Radiometry and Modulated Luminescence”, OCE Market Readiness – Phase II | 55,466 | 10/06 – 03/07 |
| Mandelis Andreas (PI) and Abrams Stephen | “Industrial Development of an Early Caries Detection Prototype using Dental Photothermal Radiometry and Modulated Luminescence”, OCE Industrial Market Readiness Project awarded to Quantum Dental Technologies, Inc. , Toronto, ON. | 86,800 | 04/07 – 09/07 |
| Mandelis Andreas | “Crack monitoring in Stackpole green sprockets by non-destructive laser Photo-Thermal Radiometry (PTR)”, OCE Collaborative Project # CM00069 (with Stackpole Ltd.) | 29,908 | May 1, 07 – Sept. 31, 07 |
| Mandelis Andreas | Premier’s Discovery Award in Science and Engineering (Ministry of Research and Innovation, Ontario) | 500,000 (5 year duration) | Award presentation: April 24, 2007 |
| Mandelis Andreas (PI) and Abrams Stephen | “Industrial Development of an Early Caries Detection Prototype using Dental Photothermal Radiometry and Modulated Luminescence-Phase II”, OCE Industrial Market Readiness Project awarded to Quantum Dental Technologies, Inc. , Toronto, ON. | 75,000 | October 1, 07 – Feb. 28, 08 |
| Mandelis Andreas | “Development of advanced photoacoustic, photothermal and photocarrier techniques and biosensors for biomedical and optoelectronic diagnostics” NSERC Discovery Grant | 53,080 | April 1, 08 – March 31, 10 |
| CHRP (NSERC-CHIR) A. Mandelis, PI; B. Zinman, Co-Investigator | “Development of a sensitive non-invasive biothermophotonic device for blood glucose monitoring in patients with diabetes” | 99,168/yr (avg.) | 2008 - 2011 |

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| Canada Research Chairs, Tier I A. Mandelis | Canada Research Chair in Diffusion-Wave Sciences and Technologies | 200,000/yr | October 2008 – Sept. 2015 |
| A. Mandelis and Quantum Dental Technologies | “R&D for Photothermal Radiometry and Modulated Luminescence Early Caries Detection Systems” The Health Technology Exchange (HTX) Business Investment Program (OCE and NRC) | 133,000 | March 2009- April 2010 |
| A. Mandelis (PI), A. Vitkin, S. Telenkov | The Photoacoustic Radar: Photothermoacoustic scanning tomography (PHAST) for early detection of breast cancer NSERC – Strategic Projects | 132,325/yr | October 2009 – Sept. 2012 |
| Mandelis Andreas | Development of advanced photoacoustic, photothermal and photocarrier techniques and biosensors for biomedical, dental and optoelectronic diagnostics NSERC Discovery Grant | 60,000/yr | April 1, 2010 - March 31, 2015 |
| Mandelis Andreas | “Research and development of two analytical instrumentation techniques: Photoacoustic-luminescence (PTA-LUM) radar/sonar and photothermal-luminescence (PTR-LUM) radar for early osteoporotic bone loss and density variation diagnosis”. Canada Council Killam Research Fellowship | 70,000/yr | Sept. 2010 – August 2012 |
| Mandelis Andreas | “Dental filling interface caries detection using photothermal radiometry and modulated luminescence” Quantum Dental Technologies, Inc. | 15,167 | March 2010-April 2011 |
| Mandelis Andreas (PI), F. Gu (Univ. of Waterloo) | “Ultrasonic (US) Imager for enhanced resolution, contrast, and fast patient screening via co-registration with photoacoustic-radar tomographic (PART) imaging of breast cancer” NSERC Research Tools and Instruments (RTI) | 139,739 | April 2011 – March 2012 |

XI. SCIENTIFIC AWARDS, SERVICE AND OTHER EVIDENCE OF IMPACT

| Date | Title-Description |
|------|-------------------|
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I. Honors and Other Evidence of Impact

Career totals: 154 Invited talks including 23 Keynote and Plenary talks, and 9 Guest and Distinguished Guest Lecturer talks at International Meetings (see “Invited Presentations”)

1970-74 Fullbright Scholar, Yale University

1974 Valedictorian and Class Councillor; Yale College Class of '74.

1988-89 Invited Professorship at ETH-Lausanne (EPFL), Switzerland.

- 1991- Editor-in-Chief of the Series "PROGRESS IN PHOTOTHERMAL AND PHOTOACOUSTIC SCIENCE AND TECHNOLOGY", currently published by SPIE Press, Bellingham, WA; (Co-Editor: Prof. P. Hess, Karls Ruprecht University, Heidelberg, Germany; 26 - member International Advisory Board).
- 1990-93 Member of the Executive Board, APS Instrument and Measurement Science Topical Group (GIMS).
- 1990-96-00 Editorial Advisory Board, Analytical Sciences (Japan Society for Analytical Chemistry); Completed two terms.
- 1992 -96 Editorial Board, International Journal of Thermophysics.
- 1995 Chairman of the 2nd Gordon Conference on Photoacoustic and Photothermal Phenomena, New London, N.H., held June 11-16, 1995.
- 1993 Fellow of the American Physical Society.
- 1993-96 Editorial Board, Review of Scientific Instruments.
- 1994 Invited Guest Editor, Ferroelectrics (Special issue on Photopyroelectric Spectroscopy and Detection, Vol. **165**, March 1995).
- 1994-2000 Secretary/Treasurer of the APS Instrument and Measurement Science Topical Group (IMSTG).
- 1994 - Member of K7 (ASME) International Committee on Thermophysics.
- 1996 - 2004 Editorial Advisory Board of NDT&E International.
- 1997 Guest Co-Editor, SPIE Optical Engineering Vol. **36**, Number 2, February 1997 (Special Section on Photoacoustic and Photothermal Science and Engineering,).
- Jan. 1997 - Associate Editor, AIP Review of Scientific Instruments.
- Jan. 1997- Dec. 1999 Editorial Board, AIP Journal of Applied Physics.
- Jan. 1997- Dec. 1999 Editorial Board, AIP Applied Physics Letters.
- Jan. 1998 - Associate Editor, International Journal of Thermophysics (Springer, New York).
- Feb. 2001 – Founder and President of the International Photoacoustic and Photothermal Association (IPPA) (Co-founder: Prof. Gerald Diebold, Brown University), a Prize-awarding Society with headquarters in Toronto, ON, and Providence, RI.
- Nov. 2000-2006 Founder and first Chair of the Division of Instrumentation and Measurement Physics (DIMP), Canadian Association of Physicists.
- Nov. 2001 Recipient of the Alexander von Humboldt Research Award, Humboldt Foundation, Germany.
- February 2003 Fellow of the International Society for Optical Engineering (SPIE).
- October 2003: Was selected and received certificate of Outstanding Reviewer for 2003, ASME Journal of Heat Transfer.
- March 2004 Recipient of the 2004 New Pioneers Award in Science and Technology, Skills for Change, City of Toronto.
- February 2006: Co-author of the 2006 Ontario Centres of Excellence Inc. Student Poster Competition Award (with A. Matvienko, R. Jeon and S. Abrams); accompanying cash award: \$2,000.
- June 2006: Associate Editor, AIP Journal of Applied Physics.

- July 2006: Fellow, Royal Society of Canada, Academy of Sciences.
- April 2007: Premier's Discovery Award in Science and Engineering, Ministry of Research and Innovation, Ontario: \$500,000 honorary research award.
- 2008 - 09: Invited Editor, Special Issue of the Journal of Applied Physics in "Applied Biophysics" (to be published in May 2009).
- November 2007: Appointed to Editorial Board, on-line journal "Diffusion Fundamentals" (www.diffusion-online.org)
- 2007: American Institute of Physics introduced PACS number 78.20.nc assigned to "photopyroelectric effects" pioneered by A. Mandelis
- February 2008: Founder and Chair of SPIE BiOS Conference on "Optics in Bone Biology and Diagnostics", Photonics West, San Jose, CA, USA.
- 2007 - Program Committee Member, SPIE BiOS (Photonics West) Annual Conference on: Photons Plus Ultrasound: Imaging and Sensing.
- October 2008: Canada Research Chair (Tier I) in Diffusion-Wave Sciences and Technologies (2008 – 2015).
- November 2008: 2009 Yeram S. Touloukian Award in Thermophysics, ASME.
- 2009: American Institute of Physics introduced PACS number 78.56.Cd assigned to "Photocarrier Radiometry" pioneered by A. Mandelis
- 2009: American Institute of Physics introduced PACS number 79.10.Ca assigned to "Deep-level photothermal spectroscopy" pioneered by A. Mandelis.
- March 2009: 2009 Senior Prize of the International Photoacoustic and Photothermal Association.
- March 2009: 2009 Canadian Association of Physicists (CAP) Medal for Outstanding Achievement in Industrial and Applied Physics.
- October 2009 - Consulting Editor, New Products, Physics Today (American Institute of Physics).
- Dec. 2009 - Member of Editorial Board, Journal of Biomedical Optics, SPIE, in charge of photothermal imaging, dental optics, and photoacoustic tomography.
- March 2010: 2010 Killam Research Fellowship – Canada Council for the Arts. The Fellowship is worth \$70,000/yr for two years and allows 100% release from teaching duties to dedicate to research project: "Research and development of two analytical instrumentation techniques: Photoacoustic-luminescence (PTA-LUM) radar/sonar and photothermal-luminescence (PTR-LUM) radar for early osteoporotic bone loss and density variation diagnosis".
- 2010: Founder of Mediterranean International Workshop on Photoacoustic & Photothermal Phenomena (Professor Roberto Li Voti, University of Rome, co-founder), Center Ettore Majorana in Erice (Sicily, Italy), July 11-18, 2010. The Workshop is within the auspices of my CRC mandate and has been approved as a biennial event under the very prestigious umbrella of the Ettore Majorana summer schools.
- 2009 – 10: Member of the International Program Committee, Advanced Laser Technologies (ALT '10), Radboud University Nijmegen, Netherlands, Sept. 11 – 16, 2010.
- 2009 – 10: Member of International Scientific Committee and Chair of Photothermal, photoacoustic and diffusion-wave sessions of Quantitative Infrared Thermography (QIRT) 10 (Sponsor: IEEE), July 27 – 30, 2010, Université Laval, Quebec City, PQ.
- 2011: Scientific Committee Member: Diffusion Fundamentals IV, A Multidisciplinary Conference on the

Fundamentals of Diffusion and its Applications, 21 - 24 August, 2011, Troy, NY.

- 2010 – 2011: International Advisory Committee: 16th International Conference on Photoacoustic and Photothermal Phenomena, Merida, Mexico, Nov. 27 – Dec. 1, 2011.
- 2010 – 2012: Scientific Program Committee: 18th Symposium on Thermophysical Properties, Boulder, CO, June 24 – 29, 2012.
- 2011: Founder (2009), Organizer, Conference Chair and two-session Chair of SPIE BiOS Conference 7883F, "Optics in Bone Biology and Diagnostics", Photonics West, January 22-26, 2011, Moscone Center, San Francisco, CA, USA.
- 2011: Session Chair, SPIE BiOS Conference # 7899 "Photons Plus Ultrasound: Imaging and Sensing 2011", Session 8: Novel Designs, Systems and Techniques, January 24, 2011.
- 2010 – 2011: Member of scientific committee, 5th Int. Conf. on Emerging Technologies in NDT, September 19 – 21, 2011, Ioannina, Greece.
- 2010 – 2011: Organizer, coordinator, and opening presenter of a Special Session on "Photothermal and Photoacoustic Thermophysics", during the 19th European Conference on Thermophysical Properties, Thessaloniki, Greece, August 28 – Sept. 1, 2011. Seven leading researcher presentations in this field have been arranged as a special event.
- 2011 - Member of Scientific Advisory Board, Quantitative InfraRed Thermography (QIRT) Journal (Lavoisier Press, France).
- 2011 Guest Editor (with Dan Fried and Mike Morris), Special Section of J. Biomed. Opt. Vol. **16** (7), July 2011: "Hard Tissue Optics and Related Methods".
- 2011, June 24: **(First Prize Winning Poster)** N. Tabatabaei and A. Mandelis, "Thermophotonic Radar Imaging of Turbid Media", Fields-MITACS Conf. on Mathematics of Medical Imaging, University of Toronto, June 20 – 24, 2011.
- 2012 The American Physical Society's 2012 Joseph F. Keithley Award for Advances in Measurement Science.
- 2013 Scientific Committee Member, Seventh International Workshop on Advances in Signal Processing for Non Destructive Evaluation of Materials (IWASPND), 31st of July - August 2nd 2013, Quebec City (Quebec), Canada

XII. INDUSTRIAL AND HEALTH-SECTOR COLLABORATIONS AND TECHNOLOGY TRANSFERS

- 1) *Alcan International Ltd.*, Kingston, Ontario, (Dr. Mel Ball: Non-Destructive Evaluation Lab.): We performed a study of a complete technology transfer through the packaging of a can-thickness measuring thermal-wave radiometric instrument for non-contact on-line use with Alcan petfood canning factory in Germany. (1990's)
- 2) *Mitel S.C.C.* (currently Dalsa Semiconductors) , Bromont, Quebec (Mr. Yan Riopel, I.C. Process R & D): An Infrared photothermal radiometric instrument optimized for semiconductor inspection was developed to correlate Mitel's Si wafer electronic transport properties with their processing history, including cleaning agents, diffusion and ion implantation. (2000 – 2005)
- 3) *Ontario Hydro Technologies (OHT)*, 800 Kipling Avenue, Toronto (Dr. S. Peralta, Electrical Systems Technology): A long-term relationship with OHT on depth profilometric evaluation of laser processed steels ended in 1997 with Hydro's restructuring. (1990's)
- 4) *Imperial Oil*, Sarnia, Ontario (Dr. Terrence Ashe, Sr. Research Chemist): A novel pyroelectric thermal-wave resonator cavity was introduced and tested successfully with Imperial's gasolines to ascertain its suitability as an on-site sensor of quality control at the pump level. (1990's)

5) *Union Carbide*, Washougal, WA (Dr. Milan Kokta, Crystal Growth Div.): Photopyroelectric spectroscopic methods developed at the University of Toronto were used to monitor the quality of Union Carbide's Ti:Sapphire laser rod surface polishes. (1992-95)

6) *Royal Canadian Mounted Police (RCMP)*: The thermal-wave resonant cavity was tested successfully as a non-destructive evaluation (NDE) diagnostic tool of Canadian and US currency counterfeits. (1996-7)

7) *B&W Heating, Kitchener*, ON (Dr. Clare Beingessner, President): Thermal-wave depth profilometric inverse-problem technology was used for the non-destructive evaluation of case hardened industrial steels. (1998- 2002).

8) *Edison Welding Institute*, Columbus, OH (Dr. Bahram Farahbakhsh, NDE Group Leader): Thermal-wave NDE characterization of thermal-barrier coatings was tested successfully. (1998- 2000).

9) *Sputtek, Inc., Etobicoke*, ON (Dr. Lee Segal, President): We have developed an optical thermometer based on laser thermorefectance and thin-film interferometry principles for remote, non-contact monitoring of sputtered TiN coating temperatures and film growth in reactor chambers under vacuum. This technology is now at the Market Readiness phase under full development for industrial use by Sputtek and other coating companies, funded by Materials and Manufacturing Ontario. (2000 – 2006).

10) *Metex, Inc., Etobicoke*, ON (Mr. S. Bawa, President): A case-depth steel hardness monitoring instrument is currently under development for fast, real-time control of the hardening process in industrial steel screws heat-treated by the Company, to replace slow and time-consuming indenter hardness measurements. The technology is the outcome of several years of fundamental thermal-wave depth-profilometric inverse-problem studies. (2007 – 2009).

11) *Four Cell Consulting*, Toronto, ON (Dr. Stephen Abrams, DDS): A combined laser-based photothermal radiometric and modulated luminescence technology is under development for monitoring early sub-surface carious lesions in teeth (enamel or dentin) occlusally or interproximally. The technology has exhibited sensitivity similar to, or better than, dental x-rays and superior lesion contrast without the risk of ionizing radiation. This technology will proceed to the Market Readiness phase in 2006 for clinical use by Four Cell Consulting (dental offices) funded by Materials and Manufacturing Ontario. (2001 -)

12) *Gates, Ltd. (formerly Stackpole)*, Mississauga, ON (Roger Lawcock, Director of Technology): A laser photothermal technique for monitoring cracks in "green" and sintered automotive parts and sprockets was developed. The technique was proven to be able to detect cracks at inner corners and on flat surfaces of Stackpole's green parts, unlike other NDT techniques. Currently a systematic study of the photothermal signal behavior on the nature of these cracks is underway, with a view to developing a crack imaging system for the Company. (2006 – 2009).

13) *Ultrasonix*, Richmond, British Columbia, Canada: Co-development of a photoacoustic laser-induced imager with a phased array transducer as an accessory to ultrasonic imaging apparatus marketed by Ultrasonix. (2009 -)

14) *Quantum Dental Technologies (QDT) Inc.*, Toronto, ON, As a UofT MIE spin-off company, QDT is a natural industrial collaborating partner with the CADIFT (I am the CTO of the Company). QDT has supported several funded projects as an industrial partner with both in-kind and cash contributions. It is about to continue its support toward the development of our dental thermophotonic imaging research with either OCE or the NSERC CREATE program. Primary contact person: Dr. Lisa Crossley, CEO. As a UofT MIE spin-off company, QDT is a natural industrial collaborating partner with the CADIFT (I am the CTO of the Company). QDT has supported several funded projects as an industrial partner with both in-kind and cash contributions. (2007 -)

15) *MDS Coating Technologies*, St. Laurent, Quebec. A preliminary (pilot) project on MDS multi-layered thermal barrier coating thermophysical property measurements was completed (2011).

16) *Avio S.p.A.*, Torino, Italy. Avio is Italy's largest aerospace company. A collaboration with the CADIFT to develop steel microhardness non-destructive thermal-wave inspection techniques for large case depths in aerospace gears has produced very promising preliminary results using the thermal-wave pulse-compression radar pioneered in the CADIFT. (2010 -)

Average Government and Industrial support to the Center for Advanced Diffusion-Wave Technologies has been in the range of \$300,000 – 500,000 annually in recent years.

XIII. SCIENTIFIC AND PROFESSIONAL ACTIVITIES

| Date | Association | Capacity |
|------|-------------|----------|
|------|-------------|----------|

SCIENTIFIC AND ENGINEERING JOURNAL REVIEWS (Current and Past)

1983 -

Acustica,
 Analytical Chemistry,
 ASME Journal of Heat Transfer,
 Applied Optics,
 Applied Physics A and B,
 Applied Physics Letters,
 Applied Spectroscopy,
 Biomedical Optics Express,
 Canadian Journal of Physics,
 IEEE Trans. Ultrasonics, Ferroelectrics, and Frequency Control (UFFC),
 Infrared Physics & Technology,
 International Journal of Thermal Sciences,
 International Journal of Thermophysics,
 IOP European Journal of Physics (several sections),
 Journal of the Acoustical Society of America,
 Journal of Applied Physics,
 Journal of Biomedical Optics,
 Journal of Biophotonics,
 Journal of the Franklin Institute,
 Journal of Optical Society of America A and B,
 Journal of Optics A-Pure and Applied Optics,
 Journal of Physical Chemistry,
 Journal of Vacuum Science and Technology,
 Measurement Science and Technology,
 NDT&E International
 Optics Express,
 Optics Letters,
 Physica Status Solidi (A and B),
 Physical Review Letters,
 Physical Review B,
 Physical Review E,
 Physics in Canada,
 Physics in Medicine and Biology,
 Physics Letters A,
 Physics Today: "Physics Update" news articles,
 Review of Scientific Instruments,
 Semiconductor Science and Technology,
 Sensors and Actuators,
 Spectrochimica Acta A,
 Thin Solid Films

COMMITTEES

Canadian: NSERC, CIHR, CHRP; NSERC Industrial Research Chair Committees.
 NSERC and NSF Grant proposals; numerous Academic Promotion and Tenure Review Committees,

USA: NSF, NIH, Department of Energy, and several National Laboratories: Argonne, Battelle; ASME K-7 Committee on Thermophysics;

International: Belgium Research Foundation, Austrian COMET Program, Cyprus Research Promotion

Foundation (RPF);

MEMBERSHIPS IN LEARNED SOCIETIES

| | | |
|-------------------|---|--|
| 1979 | American Physical Society | Fellow (as of 1993) and Lifetime Member |
| 1980 - 90 | Sigma Xi Scientific Research Society | Full Member |
| 1980 - | Canadian Association of Physicists | Full Member |
| 1986-90 | IEEE | Full Member |
| 1986-90; 2002- | ASME (American Association of Mechanical Engineers) | Full Member |
| 1994-96 | Society for Applied Spectroscopy | Full Member |
| 1993- | Society of Photo-Optical Instrumentation Engineers (SPIE) | Full lifetime member; Fellow (as of 2003) |
| 2010 - | AAAS | Full Member |
| 1983-84 | 4th International Conference in Thermal Wave Sciences, École Polytechnique, Montréal, Québec, Summer 1985 | Invited co-organizer/Scientific Program Committee |
| 1988-89 | 6th International Conference on Photoacoustic and Photothermal Phenomena, John's Hopkins University, Baltimore, MD, Summer 1989 | Invited co-organizer/Scientific Program Committee Invited Session Chair: "Biology and Medicine" Invited Proceedings Review and Publication Panel |
| 1989 | American Physical Society: March Meeting, March 20-24, 1989, St. Louis, MO. Two invited symposia on the Instrumentation and Measurement Science Topical Group: Photoacoustic and Photothermal Instrumentation and Measurement: | Invited organizer and I-Symposium 15, March 22, II- Symposium L5, March 22 |
| 1990 | Symposium on Physical Acoustics, Catholic Univ. Kortrijk, June 19-22 | Invited Session Chair: "Topic A: Photoacoustics" |
| 1990 | American Physical Society: March Meeting, March 12-16, 1990, Anaheim, CA. Invited symposium of the Instrumentation and Measurement Science Topical Group: Photoacoustic and Photothermal Instrumentation and Measurement: I-Symposium 15, March-II Symposium L5, March 22 | Organizer and chair: |
| 1990 | Federation of Analytical Chemistry and Spectroscopy Societies, 17th Annual Meeting (FACSS XVII), October 7-12, Cleveland, OH | Co-chair of Session on Photothermal Spectroscopy |
| 1991 | 7th International Conference on Photoacoustic and Instrumentation" and Photothermal Phenomena, Doorwerth, Holland, August 26-31 | Session Chair: "Experimental Techniques and |
| 1992 | American Physical Society: March Meeting, March 16-20, 1992, Indianapolis, IN. Invited symposium of the Instrumentation and Measurement Science Topical Group: Photoacoustic and Photothermal Instrumentation; Symposium K3, March 18 | Organizer and chair: |
| 1992-95 | Director, | Canadian Association for Research in Non-Destructive Evaluation (CARNDE) |
| 1992 | 8th International Topical Meeting on Photoacoustic and Photothermal Phenomena, Member of International Committee. Proceedings Review and Publication Panel, Pointe-à-Pitre, Guadeloupe (France), Jan. 22-25, 1994 | |

- 1994 12th Symposium on Thermophysical Properties, Boulder, CO, June 19-24 Special Session organizer and chair: "Laser Photothermal, Techniques"
- 1995 Ferroelectrics Guest Editor, Special issue on Photopyroelectric Spectroscopy and Detection, Vol. **165**, Numbers 1-2
- 1995-96 9th International Conference on Photoacoustic and Photothermal Phenomena, Nanjing, China, June 27-30, 1996 Member of International Committee
- 1997 American Physical Society: March Meeting March 17-21, 1997, Kansas City, MO. Organizer and Chair: Invited Symposium on "Advanced Semiconductor Characterization; Instrumentation and Techniques", Co-sponsored by the Instrumentation and Measurement Science (IMSTG) and Forum for Industrial and Applied Physics (FIAP)
- 1997 III Int. Workshop on "Advances in Signal Processing for NDE of Materials", Organizer and Chair of Invited Session on "Inverse Problems", Quebec City, P.Q., August 5-8, 1997
- 1998 10th International Conference on Photoacoustic and Photothermal Phenomena, Rome, Italy. Member of International Committee
- 1998 American Physical Society: March Meeting, March 16-20, 1998, Los Angeles, CA. Organizer and Chair: Invited Symposium on "Measurement Methods of Imaging Science and Non-Destructive Evaluation"
- 1999 American Physical Society: APS Centennial March Meeting: Invited Speaker Keithley Award Session, LC17 4 "A Century of Photothermal and Photoacoustic Spectroscopies and Microscopies"
- 2000-SPIE) Program Committee: Biomedical Optoacoustics (BIOS annual Conf. On Biomedical Optics, San Jose, CA;
- 2000-2001 Consultant to Physical Chemistry Division of the IUPAC, re. "Quantities, Terminology and Symbols in Photothermal and Related Spectroscopies"
- 2000-2002 Chair, Organizer and Host of the 12th Int. Conference on Photoacoustic and Photothermal Phenomena, June 24-27, 2002, Toronto, ON, Canada.
- 2001- Member of the Council, Canadian Association of Physicists
- 2000-2004 Annually organized and chaired sessions in SPIE's Biomedical Optoacoustics I - IV (BIOS, San Jose, CA; A. Oraevsky, Chair).
- 2002-03 Co-Chair of 15th Symposium on Thermophysical Properties, June 22-27, 2003, Boulder, CO (Organized by NIST)
- 2004 International Scientific Committee Member, 13th Int. Conference on Photoacoustic and Photothermal Phenomena, Rio de Janeiro, Brazil
- 2004 Technical Program Committee; Noise and Information in Nanoelectronics, Sensors and Standards, 2nd SPIE Int. Symp. Fluctuations and Noise, Maspalomas, Grand Canaria, Spain, May 26 –28, 2004.
- 2004 Member of the Council, Canadian Association of Physicists (CAP).
2004. CAP 2004 Congress Co-Organizer and Chair of 6 invited and contributed sessions, Winnipeg, MAN, June 14-16.
- 2005 Technical Program Committee; Noise and Information in Nanoelectronics, Sensors and Standards, 2nd SPIE Int. Symp. Fluctuations and Noise, Austin, TX.
- 2005-06 Co-Chair and Member of Executive Board of 16th Symposium on Thermophysical Properties, July 2006,

Boulder, CO (Organized by NIST)

- 2005-06 Executive Board, "Thermo International 2006" (Comprises: 16th Symposium on Thermophysical Properties; 19th International Conference on Chemical Thermodynamics; and 61st Calorimetry Conference), July 2006, Boulder, CO (Organized by NIST)
- 2006 International Scientific Committee Member, 14th Int. Conference on Photoacoustic and Photothermal Phenomena, Cairo, Egypt
- 2005- 06 Member of the Scientific Committee, 9th European Conference for Non-Destructive Testing (ECNDT), Berlin, Sept. 25– 29, 2006
- 2005 – 06: Guest Editor, Physics in Canada Special issue on Instrumentation and Measurement Physics, Vol. **62** (2) March/April 2006.
- 2005 - Annual Conference Chair in SPIE Photons Plus Ultrasound and Biomedical Thermoacoustics, Optoacoustics and Acousto-Optics, (BIOS 2005 - , San Jose, CA; A. Oraevsky and L. V. Wang, Co-Chairs).
- 2006 CAP 2006 Congress Co-Organizer and Chair of 8 invited and contributed sessions, Division of Instrumentation and Measurement Physics (DIMP), St. Catharines, ON, June 11 -14, 2006.
2006. Organizer and Chair, Biothermophotonics and Bioacoustophotonics Sessions, International Conference on Applications of Photonic Technology, Québec City, QC, June 5-8, 2006.
2006. Organizer and Chair, Session: "Properties of Solids", 16th Symp. Thermophys. Prop., July 30 – Aug. 4, 2006 (Boulder, CO)
- 2006 Co-organizer, Session "Property Needs in Biothermophotonics", 16th Symp. Thermophys. Prop., July 30 – Aug. 4, 2006 (Boulder, CO)
2007. APS March Meeting, Group for Instrumentation Science (GIMS) Focus Session Organizer: 1) Session B38: Bioinstrumentation and Biophotonic Technologies; 2) Session A38: Acoustic and Optical Instrumentation.
2007. Session Chair, "Radiography and Tomographic Methods", 4th Int. Conf. Emerging Technologies in Non-Destructive Testing, April 2-4, 2007 (Stuttgart, Germany).
- 2007 - International Association for Dental Research (IADR) Member
- 2007 - Virtual Researcher on Call (www.vroc.ca) Conducts teleconference tutorial lectures for Ontario high school students on the thematic area of "Waves and diffusion waves". VROC works with Canadian University research professors and aims to inspire high-school students to careers in research.
- 2007 Member of International Scientific Committee, 4th Int. Conf. Emerging Technologies in Non-Destructive Testing, April 2-4, 2007 (Stuttgart, Germany).
- 2007 – 2009 International Scientific Committee Member, 15th Int. Conference on Photoacoustic and Photothermal Phenomena, Leuven, Belgium.
- 2007 - 09 Program Committee Member, SPIE BiOS 2008 Conference on: Photons Plus Ultrasound: Imaging and Sensing, January 2008.
- 2008-09 Organizer and Session Chair, 17th NIST/ASME Symposium of Thermophysical Properties, June 2009, Boulder, CO (Organized by the NIST)
- 2009 - Founder and Chair, SPIE BiOS Conference # 7166 "Optics in Bone Biology and Diagnostics"; inaugurated January 23, 2009 in San Jose, CA, USA.

- 2010 Organizer and session chair, SPIE BiOS Conference # 7548F "Optics in Bone Biology and Diagnostics"; January 2010, San Francisco, CA, USA.
- 2009 - 10 Member of International Scientific Committee and Chair of Photothermal, photoacoustic and diffusion-wave sessions of Quantitative Infrared Thermography (QIRT) 10 (Sponsor: IEEE), July 27 – 30, 2010, Universite Laval, Quebec City, PQ.
- 2010 Member of the International Program Committee, Advanced Laser Technologies (ALT '10), Radboud University Nijmegen, Netherlands, Sept. 11 – 16, 2010.
- 2010 Co-Founder (with Professor Roberto Li Voti) and Director of *First Mediterranean International Workshop on Photoacoustic & Photothermal Phenomena* Center Ettore Majorana in Erice (Sicily, Italy), July 11-18, 2010.
- 2010 - 11 Member of International Scientific Committee and Proceedings Editor, 16th Int. Conference on Photoacoustic and Photothermal Phenomena, CINVESTAV, Merida, Mexico, Nov. 2011.
- 2011 Organizer of Special Session on Photothermal Thermophysics, 19th European Conf. on Thermophysical Properties, Thessaloniki, Greece, Aug. 28 – Sept. 1, 2011.
- 2010 - 11 Program Committee Member, SPIE BiOS 2011 Conference on: Photons Plus Ultrasound: Imaging and Sensing, January 2011.
- 2010 - Member of the Joint ASME-AIChE Committee on Thermophysical Properties.
- 2011 Organizer and session chair, SPIE BiOS Conference # 7883F "Optics in Bone Biology and Diagnostics"; January 22, 2011, San Francisco, CA, USA.
- 2011 Session Chair, SPIE BiOS Conference # 7899 "Photons Plus Ultrasound: Imaging and Sensing 2011", Session 8: Novel Designs, Systems and Techniques, January 24, 2011.
- 2010-11 Member of scientific committee, 5th Int. Conf. on Emerging Technologies in NDT, September 19 – 21, Ioannina, Greece.
- 2010-11 Member of Scientific Committee, Int. Congress on Ultrasonics, Inst. of Experimental Physics, Univ. of Gdansk, Poland, 5 – 8 Sept. 2011
- 2011 Member of Scientific Committee, Diffusion Fundamentals IV, August 21st- 24th, Rensselaer Polytechnic Institute, Troy, NY, USA
- 2011 Session Chair, Special Session on Photothermal and Photoacoustic Thermophysics 1, 19th European Conf. on Thermophysical Properties, Thessaloniki, Greece, August 28 – Sept. 1, 2011.
- 2011 Session Chair, Special Session on Photothermal and Photoacoustic Thermophysics 2, 19th European Conf. on Thermophysical Properties, Thessaloniki, Greece, August 28 – Sept. 1, 2011.
- 2011 Plenary Session Chair, Tuesday Nov. 29; speaker: Lihong Wang, "Photoacoustic tomography: ultrasonically breaking through the optical diffraction limit", 16th Int. Conf. on Photoacoustic and Photothermal Phenomena (ICPPP), Merida, Mexico, Nov. 27 – Dec. 1, 2011.
- 2011 Session Chair, Tuesday Nov. 29: "Medical, Dental and Biological Applications", 16th Int. Conf. on Photoacoustic and Photothermal Phenomena (ICPPP), Merida, Mexico, Nov. 27 – Dec. 1, 2011.
- 2011 - 12 Program Committee Member, SPIE BiOS 2012 Conference on: Photons Plus Ultrasound: Imaging and Sensing, January 2012.
- 2011 Chair of International Photoacoustic and Photothermal Association (IPPA) 2011 Prize awarding ceremony, Wednesday Nov. 30, 16th Int. Conf. on Photoacoustic and Photothermal Phenomena (ICPPP), Merida, Mexico.

- 2011-12 Organizer and Session Chair, 18th NIST/ASME Symposium of Thermophysical Properties, June 2012 Boulder, CO (Organized by the NIST).
- 2011-12 Director (with Professor Roberto Li Voti) of Second Mediterranean International Workshop on Photoacoustic & Photothermal Phenomena: Focus on BIOMEDICAL and NANOSCALE IMAGING and NDE”, Center Ettore Majorana in Erice (Sicily, Italy), April 19-26, 2012.
- 2012 Member of the International Program Committee, Advanced Laser Technologies (ALT '12), Thun, Switzerland, Sept. 2 – 6, 2012.

XIV. SERVICE: UNIVERSITY, PROVINCIAL, FEDERAL (CANADA) AND INTERNATIONAL

2001 – 03

1. MIE Laser Safety Committee
2. UTMIE Graduate Studies Committee
3. UTMIE Engineering Library Liaison

2002 - 08

1. Research Leave Grant Committee
2. Proposal reviewer for Ukraine, Cyprus and NSF.

2004 - 05

1. Member of NSERC Grant Selection Committee (GSC) 29 (General Physics) (Discovery Grants; and Research Tools and Instruments), 2004 - 2007.
2. NSERC GSC 28 (Condensed Matter) Member (Research Tools and Instruments) 2004 - 2007.
3. Member of the Council, Canadian Association of Physicists; Organizing Committee of the 2005 Canadian Association of Physicists Congress, University of British Columbia, Vancouver, BC.

2005 – 06

1. Academic Appointments Committee
2. Coordinated effort to spearhead research activities in MIE; supervises microfluidics labs; initiated and supervises a new research project with post-doc salary funded by Dept.
3. Decanal Representative, FASE, Tenure Committee of Prof. Mohammad Mojahedi (ECE); April 06
4. Decanal Representative, FASE, Tenure Committee of Prof. Teng Joon Lim (ECE); May 06
5. Two Tenure Committees (University of Windsor, Dept. of Physics; Jordan University of Science and Technology, Irbid, Jordan)

2006 - 07

1. MIE Chalmers Chairs Committee
2. NSERC Review and Site Visit Committee of the Institute for Quantum Computing, Waterloo, ON, Sept. 8, 2006
3. NSERC Review and Site Visit Committee of NSERC/iCORE/GDC Industrial Research Chair in Quantum Cryptography and Communication”, Institute for Quantum Information Science, Univ. of Calgary, AB, Jan. 30, 2007
4. NSERC Workshops on Discovery Award applications for new applicants: 1) at CAP Congress, Brock University, June 14, 2006; 2) at Photonics North, Quebec City, June 7, 2006; 3) at UofT Scarborough, Sept. 20, 2006.
5. Academic Appointments Committee

2007 - 08

1. Reading Committee, Prof. F. Ben Amara
2. Engineering Science Program Review Committee
3. Academic Appointments Committee

2008 - 09

1. Invited reviewer by Austrian Science Foundation: “K-Project - Non Destructive Testing for critical Defect Analysis in Materials”, ZPT for the COMET Programme (Competence Centres for Excellent Technologies)
2. Review Committee, Small Equipment Grants Program, Alberta Advanced Education and Technology, Z. Hashisho: “Infrastructure for the air quality characterization and control research laboratory”

3. Member of the University of Toronto's VP Research Review College: Assessed large UT proposals to 1) the CFI Leading Edge and New Initiatives Fund competition; and 2) Canada Excellence Research Chairs.
4. Ontario Ministry of Colleges and Universities, 2009-10 Ontario Graduate Scholarship (OGS) Selection Panel member.
5. Reading Committee, Prof. Yu Sun
6. Engineering Science Program Review Committee
7. NSERC Discovery and I2I Grant proposal reviewer
8. NSERC Discovery Grant Appeals Committee (2009 -)
9. Academic Appointments Committee

2009 - 10

1. Academic Appointments Committee
2. Member of the University of Toronto's VP Research Review College: Assessed large UT proposals to 1) the CFI Leading Edge and New Initiatives Fund competition; and 2) Canada Excellence Research Chairs.
3. Engineering Science Program Review Committee
4. NSERC Discovery Grant Appeals Committee (2009 -)
5. National and international research proposal reviewer for numerous institutions.
6. NSERC Collaborative Health Research Projects Selection Panel member (2010 – 2013)

2010 - 11

1. Chalmers Chair Committee
2. Discussion leading and follow-up committee for the Mechanical Engineering side of DRDC-UT/MIE Research Collaboration Workshop Day, November 17, 2010
3. Engineering Science Program Review Committee
4. Member of the University of Toronto's VP Research Review College: Assessed large UT proposals to 1) the CFI Leading Edge and New Initiatives Fund competition; and 2) Canada Excellence Research Chairs.
5. High-School Arts and Sciences Mentorship Program participant
6. NSERC Discovery Grant Appeals Committee (Summer 2009 -)
7. NSERC – CIHR CHRP (Collaborative Health Research Projects) Panel (CHRP 360) (2011 – 2013)
8. NSERC Research Partnerships Program Committee (Reviewed Quantum Cryptography Research Chair, Univ. of Calgary).
9. ASME K7 Committee on Thermophysics

2011 - 12

1. NSERC Discovery Grant Appeals Committee (Summer 2009 -)
2. NSERC – CIHR CHRP (Collaborative Health Research Projects) Panel (CHRP 360) (2011 – 2013)
3. ASME K7 Committee on Thermophysics

XIV. INDUSTRIAL AND ENTREPRENEURIAL ACTIVITIES

1) *Founder, Chairman, President and CTO of Photo-Thermal Diagnostics (PTD), Inc.*, Toronto, ON. The company was founded in 2001 as a UofT spin-off semiconductor metrology company through venture capital investment of \$1.27 Million (Triax, Covington Capital) following a successful UofT Excellerator Business Plan competition in which PTD, Inc., won 2nd place. The Company's intellectual property is based on a decade of developments in Laser Infrared Photothermal Radiometry of electronic materials and the 2003 introduction of Photo-Carrier Radiometry at the UofT as a new diagnostic technology for semiconductor material and device transport properties. Currently, PTD has transitioned to a new spin-off company, Diffusion-Wave Diagnostic Technologies, of Toronto, ON, (see item # 3 below).

2) *Co-founder and CTO of Quantum Dental Technologies (QDT), Inc.*, Toronto, ON (www.thecanarysystem.com). The company was founded as a UofT spin-off dental thermophotonic diagnostics company in February 2007 in partnership with Dr. Stephen Abrams, DDS, as the President. The Company's intellectual property is based on a seven years of development of Laser Photothermal Radiometry and Modulated Luminescence in teeth at the UofT as a combined early demineralization caries diagnostic technology with the ability to detect incipient caries before dental x-rays, both occlusally and interproximally. QDT has received its first infusion of capital from Materials and Manufacturing Ontario (OCE) in the form of Industrial Market Readiness awards to develop the first engineering prototype of the dental probe. The company tied for 1st place (and received \$6,500 award) at a Business Plan

competition sponsored by the Schulich School of Business, York University, Toronto, ON and by Sanofi Pasteur Healthcare & Biotechnology Venture Challenge (November 8, 2007). The Company currently markets the “Canary Early Caries Detection System”.

3) *Founder and CEO, Scarborough Science Associates*, Toronto, ON. The company acts as a consultant to, and Administers, New Products reports for, the American Institute of Physics for their international flagship magazine “Physics Today” and for the research journal “Review of Scientific Instruments”. Andreas Mandelis is the New Products Editor for these publications.

4) *Founder and President, Diffusion-Wave Diagnostic Technologies, Inc.*, (www.diffusewavetech.com) Toronto, ON. This company was established in 2009 with a mandate to commercialize promising instrumentation technologies as they are being developed in the Center for Advanced Diffusion-Wave Technologies, University of Toronto. Current foci: Industrial steel hardness case depth NDT; Solar cell optoelectronic NDT and imaging; and biophotoacoustic imaging.

XV. BIOGRAPHICAL INFORMATION

Andreas Mandelis is a Full Professor of Mechanical and Industrial Engineering; Electrical and Computer Engineering; and the Institute of Biomaterials and Biomedical Engineering, University of Toronto. He has been the Chairman, and CTO of Photo-Thermal Diagnostics, Inc., Toronto, ON, Canada. He is the President and CTO of Diffusion-Wave Diagnostic Technologies, Inc., Toronto, ON (www.diffusionwavetech.com), and the CTO of Quantum Dental Technologies, Inc., Toronto, ON, Canada (www.thecanarysystem.com). He was born in Kerkyra (Corfu), Greece. He received his BS degree (Magna cum Laude) in physics from Yale University in 1974, and MA, MSE, and Ph.D. degrees from the Applied Physics and Materials Laboratory, Department of Mechanical and Aerospace Engineering, Princeton University. He joined the electronics industry in the silicon Process R&D as a Member of Scientific Staff, Bell Northern Research Labs, Ottawa, in 1980-1981. He is the Director of the Center for Advanced Diffusion-Wave Technologies (CADIFT) at the University of Toronto. He is the author and co-author of more than 310 scientific papers in refereed journals and 174 scientific and technical proceedings papers; he is the author of the book *Diffusion-Wave Fields: Mathematical Methods and Green Functions*, published by Springer-Verlag (2001) and the co-author of the book *Physics, Chemistry and Technology of Solid State Gas Sensor Devices* published by Academic Press (1993). He is the Editor-in-Chief of the book series *Progress in Photothermal and Photoacoustic Science and Technology*, published by the Society for Optical Engineering (SPIE). He has also been a guest editor of a number of special issues in the area of photoacoustic/photothermal and generally, diffusion-wave phenomena. He is an Associate Editor of the AIP Journals *Review of Scientific Instruments*, *Journal of Applied Physics* and of the Springer *International Journal of Thermophysics*. He is and/or has been on the editorial or advisory boards of the of the SPIE *Journal of Biomedical Optics*, *Journal of Applied Physics*, *Applied Physics Letters*, *International Journal of Thermophysics*, *The International Journal of NDT&E*, *Analytical Sciences (J. Chem. Soc. Japan)*, *Quantitative InfraRed Thermography (QIRT) Journal* (Lavoisier Press, France), and the (on-line journal) *Diffusion Fundamentals*. He is Consulting Editor – New Products of the AIP flagship magazine *Physics Today*. He has several inventions, 25 patents and patents pending in the area of photothermal tomographic imaging, signal processing and measurement, hydrogen sensors, dental laser diagnostics (biothermophotonics), semiconductor laser infrared photothermal radiometry, laser photo-carrier radiometry and laser biophotoacoustic tissue imaging.

He is a Fellow of the American Physical Society, a Fellow of the SPIE, and a Member of the ASME K7 Committee on Thermophysics. He has been on the Executive and Leadership of the APS Instrument and Measurement Science Topical Group and is the Founder and Chair of the Division of Instrumentation and Measurement Physics (DIMP) of the Canadian Association of Physicists (CAP). He is the Co-founder and President of the International Photoacoustic and Photothermal Association (IPPA), a scientific prize awarding society with headquarters in Toronto, CA, and Providence, USA. In 2002 he was awarded the Alexander von Humboldt Award (Germany) “*in recognition of his past accomplishments in research and teaching*”. In 2004 he was the recipient of the New Pioneers Award in Science and Technology of Skills for Change (City of Toronto) and in 2007 he was selected

among the New Pioneers for a special 15th anniversary awards celebration.

In 2006 he was elected Fellow in the Academy of Sciences of The Royal Society of Canada. The brief citation reads: *"Andreas Mandelis is an internationally renowned expert in the development, shaping and applications of diffusion-wave sciences and associated technologies. He pioneered and developed numerous techniques and devices that are now used worldwide for materials research, industrial process quality control, dental caries diagnosis and soft tissue imaging"*.

Culminating his work on the foundations of the field of diffusion waves in matter, his scientific and technical research interests span all aspects of the physics, mathematics, instrumental implementation and experimental applications of novel laser-based diffusion-wave analytical inspection and monitoring techniques, high-precision measurement methodologies, environmental sensor device development, analytical, non-destructive and spectroscopic methodologies, signal processing physics and measurement science, and imaging techniques for industrial and health sector applications. These interests are focused on fundamental physical processes as they impact instrumentation science and signal generation in the fields of thermophysics, non-radiative and radiative phenomena in electronic, optical and biomedical materials, thermal-wave and diffusion-wave phenomena in electronic and photonic media. Current interests include building the foundations of biothermophotonic and biophotoacoustic transport phenomena and frequency-domain instrumentation for imaging in hard (dental) and soft tissues.

On April 2007 he became the 2007 (inaugural) recipient of the Discovery Award in Science and Engineering, one of the Ontario Premier's Innovation Awards. In 2008 he was awarded a Canada Research Chair (Tier 1) in Diffusion-Wave Sciences and Technologies. In 2008 he became the recipient of the ASME 2009 Yeram Touloukian Award (and Medal) in Thermophysics. In 2009 he was awarded the Senior Prize of the International Photoacoustic and Photothermal Association and the Canadian Association of Physicists (CAP) Medal for Outstanding Achievement in Industrial and Applied Physics. In 2010 he was awarded a Killam Research Fellowship from the Canada Council for the Arts. He is the recipient of the American Physical Society's 2012 Joseph F. Keithley Award for Advances in Measurement Science. The brief citation reads: *"For seminal contributions to the development of new experimental techniques based on photothermal science, and the application of these techniques to a variety of real-world problems."*