THEODORIAN (THEO) BORCA-TASCIUC

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I. EDUCATION

B.S. (1995)	Physics, Bucharest University, Romania.
Ph.D. (2000)	Mechanical Engineering, University of California Los Angeles.

II. PROFESSIONAL EXPERIENCE

01/15-present	Associate Department Head for Graduate Affairs
01/15-present	Mechanical Engineering Program Director Dept. of Mechanical, Aerospace, and Nuclear Engineering (MANE) Rensselaer Polytechnic Institute (RPI)
07/13-present	Professor, MANE. Dept., RPI
01/14-05/14	Sabbatical, Institute for Microelectronics Madrid, Spain
07/07-06/13	Associate Professor, MANE. Dept., RPI
01/01-06/07	Assistant Professor, MANE. Dept., RPI
05/97-01/01	Graduate Student Researcher, Dept. of Mechanical and Aerospace Engineering, U. of California at Los Angeles, CA
01/96-05/97	Research Assistant, Dept. of Mechanical Engineering and Materials Science, Duke University, Durham, NC
10/95-01/96	Research Assistant, The Institute of the Physics and Technology of Radiation Devices; Bucharest, Romania

III. RESEARCH INTERESTS

- Thermal and Thermoelectric Metrology
- Solid-State Thermoelectric Energy Conversion
- Interface and Composite Materials Conductance
- Heat Conduction Fundamentals
- Advanced Manufacturing of Thermoelectric Devices
- Solid-State Heat Pump Systems
- Solid-State Thermoelectric Energy Harvesting Systems
- Thermal Energy Storage Composites and Systems

IV. HONORS AND AWARDS

2017	U.S. Small Business Administration's 19th Annual Small Business Excellence Award for ThermoAura Inc.
2013	School of Engineering Outstanding Team award: "Seminal Breakthroughs in Thermal Management and Thermoelectric Energy Conversion Applications"
2007, 2008, 2011	Recognized for "Commitment to high school students" by the New Visions High School Program, QuestStar
2007	Recognized by John Hopkins University, Center for Talented Youth for participation in the "Explorations in Nanoscale Science and Engineering" program

2004 NSF Faculty Early Career Development Award (CAREER). "Towards Engineering Thermal Transport and Energy Conversion in Nanomaterials Based Devices"

2004 Young Faculty Researcher Award (RPI)

V. SELECTED SYNERGISTIC ACTIVITIES

Professional Activities: **1**. Associate Editor Journal of Nanomaterials **2**. Advisory Board, 5th Forum on New Materials, CIMTEC 2010& CIMTEC 2014 Montecatini Terme, Italy. **3.** MRS Symposiums Organizer "Nanoscale Thermoelectrics - Materials and Transport Phenomena" at 2012 MRS Spring Meeting; "Nanoscale Heat Transport – From Fundamentals to Devices," at 2007 MRS Spring Meeting. **4.** ASME K8 committee (Fundamentals of Heat Transfer) member K-Committee representative for 2013 IMECE, and 2006 IMECE; Track Chair, International ASME Conference on Nanochannels, Microchannels and Minichannels, ICNMM 2009-2012; Session/Track Organizer at IMECE. **5.** Reviewer for: Journal of Microelectromechanical Systems, Journal of Micromechanics and Microengineering, Journal of Heat Transfer, International Journal of Thermophysics, Nanotechnology, Journal of Physics: Condensed Matter, Transactions on Nanotechnology, Applied Physics Letters, Transactions on Electron Devices, NSF and AFOSR Proposals.

Professional Society Membership: American Society for Engineering Education, American Society of Mechanical Engineers, Materials Research Society, and Sigma Xi.

VI. RECENT COLLABORATORS OUTSIDE RENSSELAER

B. Abad (IMM Madrid), P. Ajayan (Rice), F. H.-U. Basse (RWTH Aachen U.), N. Becker (Argonne), G. Chen (MIT), S. Dilhaire (U. Bordeaux), S. X. Dou (U. Wollonggong), J. J. Gengler (AFRL, Ohio), D. Granados (IMDEA Madrid), S. Grauby (U. Bordeaux), , S. Iruvanti (IBM), P. Jood (U. Wollonggong), K. Lofgreen (Intel), R. Mahajan (Intel), J. Maiz (IMM Madrid), C. V. Manzano (IMM Madrid), M. Martin-Gonzales (IMM Madrid), R. J. Mehta (ThermoAura Inc.), D. Music (RWTH Aachen U.), A. Nogales (IEM-CSIC Madrid), P.M. Norris (U. Virginia), M. R. Osorio (IMDEA Madrid), D. Parker (ORNL), G. Peleckis (U. Wollonggong), M. Pelin (Argonne), J. A. Perez (IMM Madrid), T. Proslier (Argonne), A. Purkayastha (Ester Industries), R. Ramprasad (U. Connecticut), M. M. Rojo (IMM Madrid), J. J. Romero (IMM Madrid), D. J. Singh (ORNL), J. M. Schneider (RWTH Aachen U.), Z. Szabo (Marist College), S. Vafaei (Bradley U.),, R. Vajtai (Rice), A. A. Voevodin (AFRL, Ohio) S.G. Volz (Ecole Centrale Paris), X. Wang (U. Wollonggong), H. Zhu (U. Connecticut)

VII. PhD THESIS ADVISOR- Prof. Gang Chen, MIT.

VIII. PAST AND PRESENT GRADUATE STUDENTS AND POST-DOCTORAL ASSOCIATES

PhD Degrees (17): Adam Wilson (2017); Devender (2015) co-advised; Samuel Moran (2015) co-advised; Indira Seshadri (2014) co-advised; Liang Han (2014), Hafez Raeisi. Fard (2014), Kamyar Pashayi, co-advised (2012), Eduardo Castillo (2012), Yanliang Zhang

(2011), Monalisa Mazumder (2009), Youngsuk Son (2008), Seongyul Kim, co-advised (2008), Abhishek Jain (2008), Claudiu Hapenciuc (2007), Sunil K. Pal, co-advised (2007), Raj Dash (2006), Wootaek Hwang (2006).

Master Degrees (27): Mark Sandler (2017), Maxim Turovtsev (2017), Assila Bataineh (2017), Nicole Mowder (2017), Harry Li (2016), Joonho Lee (2016), Markus Lewis (2016), David Gardiner (2016), Bennett Heussler (2016), Adam Kalish (2016), Stephen Peloquin (2016), Benjamin Pearce (2016), Dustin Hoffman (2016), Matthew Morrison (2016), Evan Perrault (2016), Michal Bartlomowicz (2016), Connor Pinson (2015), Michael Ringquist (2015), Jason Schomacker (2014), Hafez R. Fard (2011), Wei Jiang, co-advised (2010), Ming Wu, co-advised, (2009), Nathan Russel, co-advised, (2008), Inuk Ryu (2007), Mustafa Gursoy, co-advised, (2006), Jason C. Violante, co-advised, (2005), Claudiu L. Hapenciuc (2004).

Projects with International students: F. Kritzinger (2010), Claire Nanot (2003), Thomas Pelletier (2002), Yann LeBonn (2001).

Postdoctoral and Visiting Scholars: Saeid Vafaei (08/08-08/05), Arup Purkayastha (03/04-03/08), Karthik Chinnathambi (03/08-01/10).

Present PhD students: Andrew Gaul (2013-) co-advised, Berardo Matalucci (2015-) co-advised, Yun Zhang (2017-).

Present Master students: Wenjun Jiang (2016-), Noah Cyr (2017-).

IX. NanoTEC LAB RESEARCH GOALS

- Discover strategies to enhance energy conversion efficiency in solid-state devices
- Discover strategies to enhance thermal conductance of composite materials and across interfaces
- Develop better metrology techniques for fast, accurate, and high spatial resolution characterization of thermal and thermoelectric properties of materials and their interfaces
- Develop advanced manufacturing and testing strategies for solid-state energy conversion devices and systems
- Develop novel solid-state heat pumps and energy conversion systems that leverage the benefits of fundamental research in new thermal and thermoelectric materials

X. RESEARCH CONTRIBUTIONS FROM NanoTEC LAB

Understanding and engineering solid-state thermal and thermoelectric transport is an essential goal of Dr. T. Borca-Tasciuc's research. Towards this goal, *an important* direction is the *development of the experimental techniques* able to probe thermoelectric transport properties at nanoscale, in nanomaterials, across nanointerfaces, or to test the operation of nanoscale thermoelectric devices. These techniques are then employed for *studies of property-structure*

relationships, to understand and engineer thermal and thermoelectric transport properties as required by specific applications.

Selected examples of nanothermal and thermoelectric metrology tools developed in Dr. T. Borca-Tasciuc's lab include development of a *scanning thermal and thermoelectric microprobe* for quantitative characterization of the thermal conductivity and Seebeck coefficient with microscale resolution, [37, 46, 56, 91], *a transient method for measurement of all thermoelectric properties* as well as electrical and thermal contact resistances in films [38, 70], *a photothermoelectric technique* to determine the anisotropic thermal diffusivity and the interface thermal resistance in thin film-on-substrate systems, [4, 17, 24, 30] *a Joule heating thermometry technique* for characterization of anisotropic thermal conductivity of thin films and interface thermal resistance [12, 21, 39, 59, 68].

Thermal and thermoelectric transport investigations performed by Dr. T. Borca-Tasciuc's lab include a wide range of nanomaterials such as:

- thin film structures e.g. Si/SiC [39], Si/Ge [8, 11, 21], RuO_2 [64], Er^+ doped Y_2O_3[59]
- aligned carbon nanotube arrays [17, 26, 30]
- carbon nanotube-polymer composites [23]
- silver nanoparticle/nanowire-polymer composites [51, 55, 63]
- gold nanowire-polymer composites [55, 58]
- graphene-parrafine composites [48]
- silica nanofiber polymer composites [61]
- nanostructured bulk thermoelectrics e.g. Bi_2Te_3, Sb_2Te_3, Bi_2Se_3 and their alloys and ZnO [49, 50, 52, 53, 62]
- nanowires e.g. Pb_2Te_3, Sb_2Se_3, P3HT polymer [42 ,47, 67]

The novel nanomaterials investigated by Dr. T. Borca-Tasciuc's research team were obtained or synthesized through collaborations with world experts in nanomaterials synthesis and material structure characterization. Collaborators include Dr. G. Ramanath (RPI) – a collaboration over more than ten years on nanostructured thermoelectric materials development which yielded (among other publications) a joint *Nature Materials* article [50] and founding of ThermoAura Inc., Dr. P. Ajayan (Rice) – carbon nanotubes, Dr. L. Schadler (RPI), Dr. J. Plawsky (RPI), and Dr. R. Ozisik (RPI) – composites, Dr. Peter Sharma (Sandia National Laboratory) - thermoelectric superlattices, Dr. N. Koratkar (RPI) – graphene, boron-nitride, Dr. Jie Lian (RPI) – graphene, Dr. M. Martin-Gonzales (IMM Madrid) – electrodeposited films, nanowires, Dr. D. Music and Dr. J. M. Schneider (RWTH Aachen) – RuO_2, Dr. T. Proslier and Dr. M. Pellin (Argonne National Laboratory) – Er^+ doped Y_2O_3, Dr. H. Efstathiadis (SUNY) – Si/SiC superlattices, as well as industry partners able to transition new technologies to the market place (e.g. Ceralink, Marlow Industries, SA Photonics, and the co-owned ThermoAura Inc.).

A summary of selected results in the thermal and thermoelectric areas from Dr. T. Borca-Tasciuc's lab include:

- discovery of novel mechanisms for formation of high thermal conductivity networks in polymer composites filled with nanoparticles (patent issued) [51, 63]. Self assembly of nanoparticles in high aspect ratio structures, followed by low temperature sintering enabled by small particles size, leads to high thermal conductivity pathways which impart high thermal

conductivity to the nanocomposite; Recent results demonstrate that with proper understanding and control of the assembly process further factorial enhancements in thermal conductivity are possible, leading to highest reported values of thermal conductivity reported for polymer composites [63] .

- discovery of *a new class of highly scalable, high figure of merit, nanostructured bulk thermoelectric materials* (patent licensed by ThermoAura Inc.) [50, 52, 53, 62]. The high ZT results reported were enabled by reductions in thermal conductivity due to nanopores and nanograins. There is also a promise for ZT>2 [53] by sulfur doping control facilitated by the new bottom-up synthesis method;
- investigations of *anisotropic thermal properties* in aligned carbon nanotube arrays and aligned carbon-nanotube polymer composites [17, 23, 26, 30]. The findings include the anisotropy of aligned carbon nanotube arrays and the large degradation in thermal conductivity due to defects;
- investigation of the *interface thermal resistance* at the native interface between carbon nanotube arrays and the silicon substrate [30]. The main finding is that the native interface after Chemical Vapor Deposition (CVD) has a high thermal resistivity due to imperfect substrate-CNT contacts and the low volume fraction of CNTs in the studied arrays;
- investigations of thermal transport in Si/Ge [21] and Si/SiC [39] multilayers, RuO_2 [64] and Er^+ doped Y_2O_3 films[59]); Large thermal conductivity reductions were measured in these films and explained through the scattering effects indiced by their structure and composition;

XI. PUBLICATIONS

A. Magazine articles and published reports:

2. "Report On 6th U.S.–Japan Joint Seminar On Nanoscale Transport Phenomena—Science And Engineering," T. Borca-Tasciuc, D. G. Cahill, G. Chen, H. Daiguji, C. Dames, K. Fushinobu, T. Inoue, A. Majumdar, S. Maruyama, K. Miyazaki, M. Matsumoto, P.M. Norris, L. Shi, M. Shibahara, M. Shannon, J. Shiomi, Y. Taguchi, K. Takahashi, T. Tsuruta, S.G. Volz, E. Wang, X.F. Xu, B. Yang, and R.G. Yang, *Nanoscale and Microscale Thermophysical Engineering*, Vol 12, pp. 273-293 (2008).

1. "Thermal management: A hot topic at the nanoscale level, Borca-Tasciuc T. in *Solid State Technology* December 2004, pp. 75-76.

B. Book chapters:

3. "Novel Measurement Methods for Thermoelectric Power Generator Materials and Devices," J. Taylor, A. A. Wilson, T. Borca-Tasciuc, S. P. Moran, D.-A. Borca-Tasciuc, J. R. Maddux in print, in Thermoelectrics for Power Generation - A Look at Trends in the Technology, editors Sergey Skipidarov and Mikhail Nikitin, InTech Publishing, Rijeka, Croatia (2016).

2. "Multiphase Flow, Evaporation, and Condensation at the Microscale," Michael K. Jensen, Yoav Peles, Theodorian Borca-Tasciuc, and Satish G. Kandlikar, in *Micro Process Engineering: Fundamentals, Devices, Fabrication, and Applications*, edited by Norbert Kockmann, the fourth volume of the series: *Advanced Micro and Nano Systems*

edited by Oliver Brand, Garry K. Fedder, Christofer Hierold, Jan G. Korvink, and Osamu Tabata (2006).

1. "Experimental Techniques for Thin-Film Thermal Conductivity Characterization," Borca-Tasciuc, T., and Chen, G., in *Thermal Conductivity: Theory, Properties and Applications*, edited by Terry M. Tritt, Kluwer Academic /Plenum Publishers, which is the 13th volume of the series: Physics of Solids and Liquids (2004).

C. Refereed Journal articles

90. "Quantifying non-contact tip-sample thermal exchange parameters for accurate scanning thermal microscopy with heated microprobes," A. Wilson and T. Borca-Tasciuc, *Review of Scientific Instruments*-in press (2017).
89. "Pressure-induced insulator-to-metal transitions for enhancing thermoelectric power factor in bismuth telluride-based alloys," A. Gaul, Q. Peng, D. J. Singh, G. Ramanath, and T. Borca-Tasciuc, *Physical Chemistry and Chemical Physics*, Vol. 19, 12784-12793, (2017).
88. "The relationship between the thermoelectric generator efficiency and the device engineering figure of merit $Z_{d,\,eng}$. The maximum efficiency $\boldsymbol{\eta}$ max," C. L. Hapenciuc, T Borca-Tasciuc, and I. N. Mihailescu, *AIP Advances*, Vol. 7, 045007 1-14, (2017).
87. "Multifold Electrical Conductance Enhancements at Metal-Bismuth Telluride Interfaces Modified Using an Organosilane Monolayer," T. cardinal, M. Kwan, T. Borca-Tasciuc, and G. Ramanath, *ACS Appl. Mater. Interfaces*, Vol. 9, 2001-2005, (2017).
86. "Effect of molecular length on the electrical conductance across metal-alkanedithiol-Bi_2Te_3 interfaces," T. Cardinal, M. Kwan, T. Borca-Tasciuc, and G. Ramanath, *Appl. Phys. Lett*., Vol. 109, 173904 1-4, (2016).
85. "Harnessing Topological Band Effects in Bismuth Telluride Selenide for Large Enhancements in Thermoelectric Properties through Isovalent Doping," Devender, P. Gehring, A. Gaul, A. Hoyer, K. Vaklinova, R. J. Mehta, M. Burghard, T. Borca-Tasciuc, D. J. Singh, K. Kern, and G. Ramanath, *Advanced Materials*, Vol. 28, 6436–6441, (2016).
84. "Microwave synthesis of branched silver nanowires and their use as fillers for high thermal conductivity polymer composites," I. Seshadri, G. L. Esquenazi, T. Cardinal, T. Borca-Tasciuc, and G. Ramanath, *Nanotechnology,* Vol. 27, 175601, (2016).
83. "A novel approach to enhance the thermal conductivity of epoxy nanocomposites using graphene core–shell additives," O. Eksik, S. F. Bartoluccib, T. Guptaa, H. Fard, T. Borca-Tasciuc, and N. Koratkar, *Carbon,* Vol. 101, 239-244, (2016).
82. "Tailoring Electrical Transport Across Metal–Thermoelectric Interfaces Using a Nanomolecular Monolayer," T. Cardinal, Devender, T. Borca-Tasciuc, and G. Ramanath, *ACS Appl. Mater. Interfaces,* Vol. 8, 4275–4279, (2016).
81. "Effects of graphene concentration, relative density and cellular morphology on the thermal conductivity of polycarbonate–graphene nanocomposite foams," G. Gedler, M. Antunes, T. Borca-Tasciuc, J.I. Velasco, and R. Ozisik, *European Polymer Journal, Vol. 75,* 190-199, (2016).
80. "Anisotropic Effects on the Thermoelectric Properties of Highly Oriented Electrodeposited Bi_2Te_3 Films," C. V. Manzano, B. Abad, M. M. Rojo, Y. R. Koh, S.

Hodson, A. M. López Martinez, X. Xu, A. Shakouri, T. D. Sands, T. Borca-Tasciuc, and M. Martín-González, *Scientific reports,* Vol. 6, 19129, (2016).

79. "Multifold Increases in Thermal Conductivity of Polymer Nanocomposites through Microwave Welding of Metal Nanowire Fillers," I. Seshadri, G. L. Esquenazi, T. Borca-Tasciuc, P. Keblinski, and Ganpati Ramanath, *Advanced Materials Interfaces*, Vol. 2, 1500186 1-6, (2015).

78. "Enhanced interfacial thermal transport in pnictogen tellurides metallized with a lead-free solder alloy," "Devender, K. Lofgreen, S. Devasenathipathy, J. Swan, R. Mahajan, T. Borca-Tasciuc and Ganpati Ramanath, *Journal of Vacuum Science and Technology A*, Vol. 33, 060611 (2015).

77. "High electrical conductivity in out of plane direction of electrodeposited Bi_2Te_3 films," M. Muñoz Rojo, C. Vicente Manzano, D. Granados, M. Rodriguez Osorio, T. Borca-Tasciuc, and M. Martin-Gonzalez, *AIP Advances*, Vol. 5, 087142 (2015).

76. "Thermal conductivity measurements of high and low thermal conductivity films using a scanning hot probe method in the 3ω mode and novel calibration strategies," A. A. Wilson, M. Muñoz Rojo, Begoña Abad, J. Andrés Perez, J. Maiz, J. Schomacker, M. Martín-Gonzalez, D.-A. Borca-Tasciuc and T. Borca-Tasciuc, *Nanoscale*, Vol. 7, 15404-15412 (2015).

75. "Enhancement of thermoelectric efficiency of doped PCDTBT polymer films," J. Maiz, M. Muñoz Rojo, B. Abad, A. Wilson, A. Nogales, D.-A. Borca-Tasciuc, T. Borca-Tasciuc, and M. Martín-González, *RSC Advances*, Vol. 5, 66687-66694, (2015).

74. "On the sintering of gold nanorod assemblies towards continuous networks," F. Lai, T. Borca-Tasciuc, S. Iruvanti, and J. Plawsky, *RSC Advances*, Vol. 5, 55678-55685, (2015).

73. "Effects of chemical intermixing on electrical and thermal contact conductances at metallized bismuth and antimony telluride interfaces," Devender, R. J. Mehta, K. Lofgreen, R. Mahajan, M. Yamaguchi, T. Borca-Tasciuc and G. Ramanath, *Journal of Vacuum Science and Technology A*, Vol. 33, 020605 1-6, (2015).

72. "Liquid-gas surface tension voltage dependence during electrowetting on dielectric testing of water and 5-90 nm gold nanofluids," S, Vafaei, K. Chinnathambi, and T. Borca-Tasciuc, *Journal of Colloid and Interface Science*, in press (2015).

71. "Controlling directed self-assembly of gold nanorods in patterned PS-b-PMMA thin films," F. Lai, T. Borca-Tasciuc, and J. Plawski, *Nanotechnology*, Vol. 26, 055301 1-9, (2015).

70. "Modeling of transient thermoelectric transport in Harman method for films and nanowires," M. M. Rojo, J. J. Romero, D. Ramos, D. Borca-Tasciuc, T. Borca-Tasciuc and M. Martín-González, *International Journal of Thermal Science*, Vol. 89, 193-202, (2015).

69. "Investigation of nanofluid bubble characteristics under non-equilibrium conditions," S. Vafaei, T. Borca-Tasciuc, and D. Wen, *Chemical Engineering and Processing: Process Intensification*, Vol. 86, 116-124, (2014).

68. "Reduced stability of copper interconnects due to wrinkles and steps on hexagonal boron nitride substrates," J. Gao, P. K. Chow, A. V. Thomas, T.-M. Lu, T. Borca-Tasciuc and N. Koratkar, *Applied Physics Letters*, Vol. 105, 0123108, 1-5, (2014).

67. "Decrease in thermal conductivity in polymeric P3HT nanowires by size-reduction induced by crystal orientation: new approaches towards thermal transport engineering of organic materials," M. M. Rojo, J. Martín, S. Grauby, T. Borca-Tasciuc, S. Dilhaire and M. Martin-Gonzalez, *Nanoscale*, Vol. 6, 7858-7865, (2014).

66. "Large-Area Freestanding Graphene Paper for Superior Thermal Management," G. Xin, H. Sun, T. Hu, H. R. Fard, X. Sun, N. Koratkar, T. Borca-Tasciuc and J. Lian, *Advanced Materials*, Vol. 26, 4521–4526, (2014).

65. "Softening in silver-nanowire-filled polydimethylsiloxane nanocomposites," I. Seshadri, G. L. Esquenazi, T. Borca-Tasciuc, P. Keblinski, and G. Ramanath, *Applied Physics Letters*, Vol. 105, 0513110, 1-5, (2014).

64. "Multifold Seebeck increase in RuO_2 films by quantum-guided lanthanide dilute alloying," D. Music, F. H.-U. Basse, L. Han, Devender, T. Borca-Tasciuc, J. J. Gengler, A. A. Voevodin, G. Ramanath and J. M. Schneider, *Applied Physics Letters*, Vol. 104, 053903, 1-5, (2014).

63. "Self-Constructed Tree-Shape High Thermal Conductivity Nanosilver Networks in Epoxy," K. Pashayi, H. R. Fard, F. Lai, S. Iruvanti, J. Plawsky and T. Borca-Tasciuc, *Nanoscale*, Vol. 6, 4292-4296, (2014).

62. "Heavy Element Doping for Enhancing Thermoelectric Properties of Nanostructured Zinc Oxide," P. Jood, R. J. Mehta, Y. Zhang, T. Borca-Tasciuc, S. X. Dou, D. J. Singh, G. Ramanath, *RSC Advances*, Vol. 4, 6363-6368, (2014)

61. "Engineering the Coefficient of Thermal Expansion and Thermal Conductivity of Polymers Filled with High Aspect Ratio Silica Nanofibers," L. Ren, K. Pashayi, H. R. Fard, S. P. Kotha, T. Borca-Tasciuc, R. Ozisik, *Composites Part B: Engineering*, Vol. 58, 228-234, (2014)

60. "Role of Nanoparticles on Nanofluid Boiling Phenomenon: Nanoparticle Deposition," S. Vafaei and T. Borca-Tasciuc, *Chemical Engineering Research and Design,* Vol. 92, 842–856, (2014).

59. "Thermal Conductivity of Er^{+3}:Y_2O_3 films grown by Atomic Layer Deposition," H. R. Fard, N. Becker, A. Hess, K. Pashayi1, T. Proslier, M. Pellin and T. Borca-Tasciuc, *Applied Physics Letters*, Vol. 103, 193109 1-5, (2013).

58. "Interfacial thermal conductance-rheology nexus in metal-contacted nanocomposites," I. Seshadri, T. Borca-Tasciuc, P. Keblinski and G. Ramanath, *Applied Physics Letters*, Vol. 103, 173113 1-4, (2013).

57. "Gating heat transport by manipulating convection in a magnetic nanofluid," I. Seshadri, A. Gardner, R. J. Mehta, R. Swartout, P. Keblinski, T. Borca-Tasciuc, and G. Ramanath, *Applied Physics Letters*, Vol. 102, 203111 1-4, (2013).

56. "Scanning Probe Methods for Thermal and Thermoelectric Property Measurements," T. Borca-Tasciuc, *Annual Reviews of Heat Transfer*, Vol. 16, 211-258, Invited paper, (2013).

55. "Nanowire-filled polymer composites with ultrahigh thermal conductivity," N. Balachander, I. Seshadri, R. J. Mehta, L. S. Schadler, T. Borca-Tasciuc, P. Keblinski, and G. Ramanath, *Applied Physics Letters*, Vol. 102, 093117 1-5, (2013).

54. "Introducing Nanotechnology into the Thermal and Fluids Curricula: Pool Boiling Heat Transfer in Nanofluids," W. Sano, Z. Szabo, D.-A. Borca-Tasciuc, and T. Borca-Tasciuc, accepted, *International Journal of Mechanical Engineering Education*, Vol. 40, 276-288, (2012).

53. "Seebeck and Figure of Merit Enhancement in Nanostructured Antimony Telluride by Antisite Defect Suppression through Sulfur Doping," R. J. Mehta, Y. Zhang, H. Zhu, D. S. Parker, M. Belley, D. J. Singh, R. Ramprasad, T. Borca-Tasciuc, and G. Ramanath, *Nano Letters*, Vol. 12, 4523–4529, (2012).

52. "Lattice Thermal Conductivity Diminution and High Thermoelectric Power Factor Retention in Nanoporous Macroassemblies of Sulfur-Doped Bismuth Telluride Nanocrystals," Y. Zhang, R. J. Mehta, M. Belley, L. Han, G. Ramanath, and T. Borca-Tasciuc, *Applied Physics Letters*, Vol. 100, 1193113 1-4, (2012).

51. "High Thermal Conductivity Epoxy-Silver Composites Based on Self-constructed Nanostructured Metallic Networks," K. Pashayi, H. R. Fard, F. Lai, S. Iruvanti, J. Plawsky, and T. Borca-Tasciuc, *Journal of Applied Physics*, Vol. 111, 104310 1-6, (2012).
Paper selected for the June 4, 2012 issue of Virtual Journal of Nanoscale Science & Technology.).

50. "A New Class of Doped Nanobulk High-Figure-of-Merit Thermoelectrics by Scalable Bottom-up Assembly," Mehta, R. J., Zhang, Y., Karthik, C., Singh, B., Siegel, R. W., Borca-Tasciuc, T., & Ramanath, G., *Nature Materials*, Vol. 11, 233, (2012).

49. "Al-Doped Zinc Oxide Nanocomposites with Enhanced Thermoelectric Properties," Priyanka Jood, Rutvik J. Mehta, Yanliang Zhang, Germanas Peleckis, Xiaolin Wang, Richard W. Siegel, Theo Borca-Tasciuc, Shi Xue Dou and Ganpati Ramanath, *Nanoletters*, Vol. 11, 4337, (2011).

48. "Enhanced Thermal Conductivity in a Nanostructured Phase Change Composite Due to Low Concentration Graphene Additives," Yavari, F., Fard, H. R., Pashayi, K., Rafiee, M. A., Zamiri, A., Ozisik, R., Borca-Tasciuc, T., and Koratkar, N., *Journal of Physical Chemistry C*, Vol. 115, 8753, (2011).

47. "Threshold Conductivity Switching in Sulfurized Antimony Selenide Nanowires," Karthik, C., Jiang, W., Mehta, R. J., Castillo, E. E., and Borca-Tasciuc, T., and Ramanath, G., *Applied Physics Letters*, Vol. 99, 103101, (2011).

46. "A Non-Contact Thermal Microprobe for Local Thermal Conductivity Measurement," Zhang, Y., Castillo, E., Mehta, R., Ramanath, G., and Borca-Tasciuc, T., *Review of Scientific Instruments,* Vol. 82, 024902, (2011).

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