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I. EARNED DEGREES

- 1994-1997 ***Ph.D. in Mechanical Engineering***
 Purdue University, West Lafayette, Indiana
 Ph. D. Thesis: "*Combined Heat and Mass Transfer and Adsorption Dynamics in a Honeycomb Adsorbent*"
 Advisor: *Professor Raymond Viskanta*
- 1990-1994 ***B.S./M.S. (highest honors) in Applied Mathematics***
 M. V. Lomonosov Moscow State University, Moscow, Russia
 M.S. Thesis: "*Numerical Simulation of Conjugate Heat and Mass Transfer and Turbulent Flow over the Wall with a Porous Insert*"
 Advisor: *Professor Gennady S. Roslyakov*
- 1987-1993 ***B.S./M.S. (highest honors) in Mechanical Engineering***
 N. E. Bauman Moscow State Technical University, Moscow, Russia
 M.S. Thesis: "*Investigation of Conjugate Heat and Mass Transfer in Systems of Transpiration Cooling*"
 Advisor: *Professor Alexander I. Leontiev*

II. EMPLOYMENT

- 2000-present **Georgia Institute of Technology, Atlanta, GA, USA**
George W. Woodruff Professor (2012-Present), George W. Woodruff School of Mechanical Engineering
Woodruff Faculty Fellow (2008-2012), George W. Woodruff School of Mechanical Engineering
Professor (2008-present), George W. Woodruff School of Mechanical Engineering
Associate Professor (2005-2008), George W. Woodruff School of Mechanical Engineering
Assistant Professor (2000-2005), George W. Woodruff School of Mechanical Engineering
Initiating Member, Georgia Tech Center for Biologically Inspired Design (CBID)
Faculty Member, Parker H. Petit Institute for Bioengineering and Bioscience (IBB)
Faculty Member, MARCO/DARPA Multi-University Interconnect Focus Center (IFC)
Faculty Member, Georgia Tech Center for Drug Design, Development, and Delivery
Faculty Member, Georgia Tech Center of Fuel Cell and Battery Technology
Faculty Affiliate, Georgia Tech Integrative BioSystems Institute (IBSI)
Faculty Member, Georgia Tech Specialty Separation Center
Faculty Member, Georgia Tech Materials Council
- 1994–1999 **Purdue University, West Lafayette, IN, USA**
Postdoctoral Research Associate, School of Mechanical Engineering (1997-1999)
Graduate Research Assistant, School of Mechanical Engineering (1994-1997)
Graduate Research Assistant, Department of Physics (Summer 1998)
Researcher, Computational Finance Program (1997-1999)

- 1993-1994 **Bauman Moscow State Technical University**, Moscow, Russia
Lecturer, Department of Power Engineering
- 1992–1994 **Institute for High Temperatures**, Russian Academy of Sciences, Moscow, Russia
Research Engineer, MHD Laboratory (Head: Dr. Bituyrin)

III. SCHOLARLY ACCOMPLISHMENTS

A. PUBLISHED BOOKS AND PARTS OF BOOKS

- **Books & Parts of Books**

1. Narayanan, S., Kottke, P. A., Joshi, Y. K., and Fedorov, A.G., Gas assisted evaporation heat and mass transfer, *Annual Review of Heat Transfer*, Vol. 19, 2015 (**invited**).
2. Yazawa, K., Fedorov, A.G., Joshi, Y. K., and Shakouri, A., Energy efficient solid-state cooling for hot spot removal, In "*Cooling and Packaging Microelectronic and Nanoelectronic Equipment: Challenges, Opportunities and Emerging Technologies*" - A Festschrift for Prof. Avi Bar-Cohen, 2013.
3. Kottke, P. A., Fedorov, A.G., and Gole, J. L., Multiscale transport in porous silicon gas sensors, In *Modern Aspects of Electrochemistry*, **43/44**, M. Schlesinger (Editor), Springer, 2008 (**invited**).
4. Joshi, Y., Fedorov, A., Wei, X., and Gurrum, S. P. Limits of current heat removal technologies and opportunities, In *Integrated Interconnect Technologies for 3D Nanoelectronic Systems*, M. Bakir & J. Meindl (Editors), Artech House, 2008 (**invited**).
5. Fedorov, A.G. and Viskanta, R., Heat transfer enhancement by direct contact drying of a moving porous strip, In "*Process, Enhanced, and Multiphase Heat Transfer*" - A Festschrift for A. E. Bergles, pp. 255-266, Begell House, Inc., New York, 1997.

B. REFEREED PUBLICATIONS

- **Archival Journal Papers (Submitted/Under Review)**

1. Anderson, D. A., Yun, T. M., Kottke, P. A., and Fedorov, A. G., Comprehensive analysis of sorption enhanced steam methane reforming in a variable volume membrane reactor, *Ind. Eng. Chem. Res.*, in review (November 2016).
2. Sarvey, T. E., Hu, Y., Green, E. C., Kottke, P. A., Joshi, Y., Fedorov, A., and Bakir, M., Heterogeneous micropin-fin arrays for cooling of microelectronic hotspots, *IEEE Comp. Pack. Manuf. Tech.*, in review (August 2016).

- **Archival Journal Papers (Published/In Press/Accepted)**

1. Nasr, M. N., Green, E. C., Kottke, P. A., Zhang, H., Sarvey, T. E., Joshi, Y., Bakir, M. and Fedorov, A., Flow regimes and convective heat transfer of refrigerant flow boiling in ultra-small clearance microgaps, *Int. J. Heat Mass Transf.*, in press (2017).
2. Nasr, M. N., Green, E. C., Kottke, P. A., Zhang, H., Sarvey, T. E., Joshi, Y., Bakir, M. and Fedorov, A., Hotspot thermal management with flow boiling of refrigerant in ultras-mall microgaps, *ASME J. Electronic Packaging*, in press (2016).

3. Lorenzini, D., Sarvey, T., Zhang, X., Hu, Y., Fedorov, A., Bakir, M., and Joshi, Y. K., Embedded single phase microfluidic thermal management for non-uniform heating and hotspots using microgaps with variable pin fin clustering, *Int. J. Heat Mass Transf.*, **103**, 1359-1370 (2016).
4. Han, X., Fedorov, A., Joshi, Y. K., Flow boiling in microgaps for thermal management of high heat flux microsystems, *ASME J. Electronic Packaging*, **138** (4), 040801-13 (2016).
5. Asrar, P., Zhang, X., Green, E. C., Kottke, P. A., Sarvey, T. E., Fedorov, A., Bakir, M., and Joshi, Y., Visualization of flow boiling of R245fa in a microgap with integrated staggered pin fins, *Electronics Cooling*, June 2016 Issue, 13-16 (2016).
6. Henry, M., Kim, S. and Fedorov, A., High purity tungsten nanostructures via focused electron beam induced deposition with carrier-gas assisted supersonic jet delivery of organometallic precursors, *J. Phys. Chem. C*, **120** (19), 10584–10590 (2016).
7. Kim, S, Russell, M., Kulkarni, D., Henry, M., Kim, S., Naik, R., Voevodin, A. A., Jang, S., Tsukruk, V. V. and Fedorov, A., Activating “invisible” glue: using electron beam for enhancement of interfacial properties of graphene-metal contact, *ACS Nano*, **10**, 1042-1049 (2016).
8. Fisher, K. Kottke, P. A., Kim, S., and Fedorov A. G., Rapid electron beam writing of topologically complex 3D nanostructures using liquid phase precursor, *Nano Lett.*, **15** (12), 8385–8391 (2015).
9. Kim, S, Henry, M., and Fedorov, A., Using energized oxygen micro-jet for improved graphene etching by focused electron beam, *Appl. Phys. Lett*, **107** (23), 233102-06 (2015).
10. Zhang, X., Han, X., Sarvey, T. E., Green, E. C., Kottke, P. A., Fedorov, A. G., Joshi, Y. K., Bakir, M., 3D ICs with embedded microfluidic cooling: technology, thermal performance and electric implications, *ASME J. Electronic Packaging*, in press (December 2015).
11. Green, C., Kottke, P. A., Han, X., Woodrum, C., Sarvey, T., Zhang, X., Asrar, P., Zhang, X., Joshi, Y. K., Fedorov, A., Sitaraman, S., and Bakir, M., A review of two-phase cooling in 3D stacked electronics: technology integration, *ASME J. Electronic Packaging*, **137** (4), 040802-9 (2015).
12. Anderson, D. A., Nasr, M., Yun, T. M., Kottke, P. A., and Fedorov, A. G., Sorption-enhanced variable volume batch-membrane steam methane reforming at low temperature: experimental demonstration and kinetic modeling, *Ind. Eng. Chem. Res.*, **54** (34), 8422–8436 (2015).
13. Kim, S, Russell, M., Henry, M., Kim, S., Naik, R., Voevodin, A. A., Jang, S., Tsukruk, V. V. and Fedorov, A., Dynamic modulation of electronic properties of graphene by localized carbon doping using Focused Electron Beam Induced Deposition, *Nanoscale*, **7**, 14946-14952 (2015).
14. Kottke, P. A., Yun, T. M., Green, C., Joshi, Y. K. and Fedorov, A. G., Two-phase convective cooling for ultra-high power dissipation in microprocessors, *ASME J. Heat Transfer*, **138** (1), 011501-011507 (2015).
15. Zhou, W., Loney, Fedorov, A., D., Degertekin, F. L., Rosen, D., Shape evolution of multiple interacting droplets in inkjet deposition, *Rapid Prototyping J.*, **21** (4), 373-385 (2015).
16. Silva, J., Geryak, R., Loney, D., Kottke, P.A., Naik, R., Tsukruk, V. V., and Fedorov, A., Stick-slip water penetration into capillaries coated with swelling hydrogel, *Soft Matter*, **11**, 5933-5939 (2015).
17. Yun, T. M., Kottke, P. A., Anderson, D. A., and Fedorov, A. G., Theoretical analysis of hydrogen production by variable volume membrane batch reactors with direct liquid fuel injection, *Int. J. Hydrogen Energy*, **40** (25), 8005-8019 (2015).

18. Kim, S, Kulkarni, D., Henry, M., Zackowski, P., Jang, S., Tsukruk, V. V. and Fedorov, A., Localized conductive patterning via focused electron beam reduction of graphene oxide, *Appl. Phys. Lett.*, **106**, 133109 (2015).
19. Yun, T. M., Kottke, P. A., Anderson, D. A., and Fedorov, A. G., Experimental investigation of hydrogen production by variable volume membrane batch reactors with modulated liquid fuel introduction, *Int. J. Hydrogen Energy*, **40** (6), 2601-2612 (2015).
20. Yun, T. M., Kottke, P. A., Anderson, D. A., and Fedorov, A. G., Power density assessment of variable volume batch reactors for hydrogen production with dynamically modulated liquid fuel introduction, *Ind. & Eng. Chem. Res.*, **53** (47), 18140–18151 (2014).
21. Sahu, V., Fedorov, A., Joshi, Y. K., Bahk, J.-H., Wang, X., and Shakouri, A., Experimental characterization of hybrid solid-state and fluidic cooling for thermal management of localized hotspots, *IEEE Comp. Pack. Manuf. Tech.*, **5**(1), 57-64 (2015).
22. Tibavinsky, I. A., Kottke, P. A., and Fedorov, A. G., Microfabricated ultrarapid desalting device for nanoelectrospray ionization mass spectrometry, *Anal. Chem.*, **87** (1), 351-356 (2015).
23. Fedorov, A., Kim, S, Henry, M., Kulkarni, D., Tsukruk, V. V., Focused electron beam induced processing (FEBIP) for emerging applications in carbon nanoelectronics, *Appl. Phys. A – Mat. Sci. & Proc.*, **117** (4), 1659-1674 (2014) **invited**.
24. Anderson, D. A., Kottke, P. A., and Fedorov, A. G., Thermodynamic analysis of hydrogen production via sorption-enhanced steam methane reforming in a new class of variable volume batch-membrane reactors, Special Issue of *Int. J. Hydrogen Energy*, **39**, 17985-17997 (2014) **invited**.
25. Zhou, W., Loney, Fedorov, A., D., Degertekin, F. L., Rosen, D., Shape evolution of multiple interacting droplets in inkjet deposition, *Rapid Prototyping J.*, in press (March 2014).
26. Anderson, D. A., Kottke, P. A., and Fedorov, A. G., Thermodynamic analysis of hydrogen production via sorption-enhanced steam methane reforming in a new class of variable volume batch-membrane reactors, Special Issue of *Int. J. Hydrogen Energy*, in press (February 2014), **invited**.
27. Sahu, V., Fedorov, A., Joshi, Y. K., Bahk, J.-H., Wang, X., and Shakouri, A., Experimental characterization of hybrid solid-state and fluidic cooling for thermal management of localized hotspots, *IEEE Comp. Pack. Manuf. Tech.*, in press (June 2014).
28. Kim, S, Kulkarni, D., Davis, M., Kim, S., Naik, R., Voevodin, A. A., Jang, S., Tsukruk, V. V. and Fedorov, A., Controlling physicochemical state of carbon on graphene using Focused Electron Beam Induced Deposition, *ACS Nano*, **8** (7), 6805–6813 (2014).
29. Plawsky, J. L., Fedorov, A. G., Garimella, S. V., Ma, H. B., Maroo, S. C., Chen, L., and Nam, Y., Nano- and microstructures for thin film evaporation – a review, *Nanoscale & Microscale Thermophys. Eng.*, **18**, 251-269 (2014), **invited**.
30. Kulkarni, D., Kim, S., Chyasnavichyus, M., Hu, K., Fedorov, A., and Tsukruk, V. V. Chemical reduction of individual graphene oxide sheets as revealed by electrostatic force microscopy, *J. Am. Chem. Soc.*, **136** (18), 6546–6549 (2014).
31. Green, C. E., Fedorov, A., and Joshi, Y. K., Time scale matching of dynamically operated devices using composite thermal capacitors, *Microelectronics J.*, **45**, 1069-1078 (2014).

32. Sahu, V., Fedorov, A., Joshi, Y. K., Transient characterization of hybrid microfluidic-thermoelectric cooling scheme for dynamic thermal management of microprocessors, *ASME/IEEE J. Electronic Packaging*, **136** (3), 31014-31019 (2014).
33. Sahu, V., Fedorov, A., Joshi, Y. K., Computational and experimental investigation of thermal coupling between superlattice coolers, *IEEE Trans. Adv. Pack.*, **4** (4), 622-631 (2014).
34. Zhou, W., Loney, Fedorov, A., D., Degertekin, F. L., Rosen, D., Lattice Boltzmann simulations of multiple droplet interaction dynamics, *Phys. Rev. E*, **89** (3), 033311 (2014).
35. Meacham, J. M., Durvasula, K., Degertekin, F. L. and Fedorov, A., Physical methods for intracellular delivery: practical aspects from laboratory to industrial scale processing, *Journal of Laboratory Automation (JALA)*, Special Issue on Advancements in Biomedical Micro/Nano Tools and Technology, **invited**, **19** (1), 1-18 (2014).
36. Zhou, W., Loney, Fedorov, A., D., Degertekin, F. L., Rosen, D., Lattice Boltzmann simulations of multiple droplet interaction dynamics, *Phys. Rev. E*, **89** (3), 033311 (2014).
37. Meacham, J. M., Durvasula, K., Degertekin, F. L. and Fedorov, A., Physical methods for intracellular delivery: practical aspects from laboratory to industrial scale processing, *Journal of Laboratory Automation (JALA)*, Special Issue on Advancements in Biomedical Micro/Nano Tools and Technology, **invited**, **19** (1), 1-18 (2014).
38. Zhou, W., Loney, D., Degertekin, F. L., Rosen, D., Fedorov, A., What controls dynamics of droplet shape evolution upon impingement on a solid surface?, *AIChE J.*, **59** (8), 3071-3082 (2013).
39. Gittens, R.A., Olivares-Navarrete, R., Cheng, A., Anderson, D., McLachlan, T., Stephan, I., Fedorov, A., Rupp, F., Geis-Gerstorfer, J., Sandhage, K.H., Boyan, B.D., and Schwartz, Z., The role of titanium surface micro/nanotopography and wettability on the differential response of human osteoblast lineage cells, *Acta Biomaterialia*, **9**, 6268-6277 (2013).
40. Hildreth, O., Rykaczewski, K., Fedorov, A., and Wong, C. P., A DLVO model for catalyst motion in Metal-assisted Chemical Etching based upon controlled out-of-plane rotational etching and force-displacement measurements, *Nanoscale*, **5**, 961-970 (2013).
41. Narayanan, S., Fedorov, A., and Joshi, Y., Heat and mass transfer during evaporation of thin liquid films confined by porous membrane subjected to air jet impingement, *Int. J. Heat Mass Trans.*, **58**, 300-311 (2013).
42. Hildreth, O., Fedorov, A., and Wong, C. P., 3D spirals with controlled chirality fabricated using metal-assisted chemical etching of silicon, *ACS Nano*, **6** (11), 10004-10012 (2012).
43. Kim, S, Kulkarni, D., Rykaczewski, K., Henry, M., Tsukruk, V. V. and Fedorov, A., Fabrication of an ultra-low-resistance Ohmic contact to MWCNT-metal interconnect using graphitic carbon by Electron Beam Induced Deposition (EBID), *IEEE Trans. Nano*, **11** (6), 1223-1230 (2012).
44. Kim, S., Kim, Y. J., Joshi, Y. K., Fedorov, A., and Kohl, P. A., Absorption heat pump/refrigeration system utilizing ionic liquid and hydrofluorocarbon refrigerants, *ASME/IEEE J. Elect. Pack.*, **134**, 031009-0130180 (2012).
45. Kim, Y. J., Kim, S., Joshi, Y. K., Fedorov, A., and Kohl, P. A., Thermodynamic analysis of an absorption refrigeration system with ionic-liquid/refrigerant mixture as a working fluid, *Energy*, **44** (1), 1005-1016 (2012).

46. Wei, W., Fedorov, A., Luo, Z., and Ni, M., Radiative properties of dense nanofluids, *Appl. Optics.*, **51** (25), 6159-6171 (2012).
47. Anderson, D., Gupta, M., Voevodin, A., Hunter, C., Putnam, S.A., Tsukruk, V.V., and Fedorov, A., Using amphiphilic nanostructures to enable long-range ensemble coalescence and surface rejuvenation in dropwise condensation, *ACS Nano*, **6** (4), 3262-3268 (2012).
48. Kottke, P.A. and Fedorov, A., Physics-based, reduced-order gas cloud with radiative transport model for rapid simulation of hyperspectral infrared sensors, *Optical Eng.*, **51** (5), 056401-11 (2012).
49. Zhou, W., Loney, D., Fedorov, A., Degertekin, F. L., Rosen, D., Droplet impact dynamics in ink-jet manufacturing, *Virtual & Physical Prototyping Journal*, **7** (1), 49-64 (2012).
50. Kulkarni, D., Kim, S-K., Fedorov, A., and Tsukruk, V. V., Fast light-induced phase transformations of carbon on metal nanoparticles, *Adv. Funct. Mat.*, **22** (10), 2129-2139 (2012).
51. Narayanan, S., Fedorov, A., and Joshi, Y., Interfacial transport of evaporating water confined in nanopores, *Langmuir*, **27** (17), 10666-10676 (2011).
52. Varady, M. J. and Fedorov, A., Fuel reformation and hydrogen generation with direct droplet impingement reactors: parametric studies and design consideration for portable methanol steam reformers, *Ind. & Eng. Chem. Res.*, **50**, 9514-9524 (2011).
53. Varady, M. J. and Fedorov, A., Fuel reformation and hydrogen generation with direct droplet impingement reactors: model formulation and validation, *Ind. & Eng. Chem. Res.*, **50**, 9502-9513 (2011).
54. Rykaczewski, K., Hildreth, O.J., Wong, C.P., Fedorov, A., and Scott, J. H. J., Guided three-dimensional catalyst folding during Metal-assisted Chemical Etching of silicon, *Nano Lett.*, **11** (6), 2369-2374 (2011).
55. Henry, M. R., Kim, S., Rykaczewski, and Fedorov, A., Inert gas jets for growth control in electron beam induced deposition, *Appl. Phys. Lett.*, **98**, 263109 (2011).
56. Kulkarni, D., Rykaczewski, K., Singamaneni, S., Kim, S-K., Fedorov, A., and Tsukruk, V. V., Thermally-induced transformations of amorphous carbon nanostructures fabricated by Electron Beam Induced Deposition, *ACS Appl. Mat. & Interfaces*, **3** (3), 710-720 (2011).
57. Rykaczewski, K., Scott, J. H. J., Fedorov, A., Electron beam heating effects during ESEM imaging of water condensation on superhydrophobic surfaces, *Appl. Phys. Lett.*, **98**, 093106 (2011).
58. Rykaczewski, K., Hildreth, O.J., Wong, C.P., Fedorov, A., and Scott, J. H. J., Directed 2D-to-3D pattern transfer method for controlled fabrication of topologically complex three-dimensional features in silicon, *Adv. Mater.*, **23**(5), 659-663 (2011).
59. Forbes, T. P., Degertekin, F.L., and Fedorov, A., Droplet charging regimes in ultrasonic atomization of a liquid electrolyte in an external electric field, *Phys. Fluids*, **23**, 012104 (2011).
60. Forbes, T. P., Degertekin, F.L., and Fedorov, A., Regime transition in electromechanical fluid atomization and implications on analyte ionization for mass spectrometric analysis, *J. Am. Soc. Mass Spec.*, **21**, 1900-1905 (2010).
61. Dietz, C., Rykaczewski, K., Fedorov, A., and Joshi, Y., ESEM imaging of condensation on a nanostructured superhydrophobic surface, *ASME J. Heat Transf.*, **132** (8), 080904 (2010).

62. Dietz, C., Rykaczewski, K., Fedorov, A., and Joshi, Y., Visualization of droplet departure on a superhydrophobic surface and implications to heat transfer enhancement during drop-wise condensation, *Appl. Phys. Lett.*, **97** (3), 033104-033106 (2010).
63. Forbes, T. P., Degertekin, F.L., and Fedorov, A., Electrochemical ionization and analyte charging in Array of Micromachined UltraSonic ElectroSpray (AMUSE) ion source, *J. Electroanal. Chem.*, **645** (2), 167-173 (2010).
64. Meacham, J.M., O'Rourke, A., Yang, Y., Fedorov, A., Degertekin, F.L., and Rosen, D.W., Micromachined ultrasonic print-head for deposition of high viscosity materials, *ASME J. Manuf. Sci. Eng.*, **132** (3), 030905-030916 (2010).
65. Narayanan, S., Fedorov, A., and Joshi, Y., On-chip thermal management of hot spots using a perspiration nanopatch, *J. Micromech. Microeng.*, **20** (7), 075010-075020 (2010).
66. Rykaczewski, K., Hildreth, O.J., Kulkarni, D., Henry, M., Kim, S-K., Wong, C.P., Tsukruk, V. V., and Fedorov, A., Maskless and resist-free rapid prototyping of three dimensional silicon structures through Electron Beam Induced Deposition (EBID) of carbon in combination with Metal assisted Chemical Etching (MaCE) of Silicon, *ACS Appl. Mat. & Interfaces*, **2**(4), 969-973 (2010).
67. Kim, Y. J., Joshi, Y., and Fedorov, A., Thermally dependent characteristics and spectral hole burning of double-lasing quantum-dot laser, *J. Appl. Phys.*, **107**, 073104-073111 (2010).
68. Forbes, T. P., Degertekin, F.L., and Fedorov, A., Electrohydrodynamics of charge separation in droplet-based ion sources with time-varying electrical and mechanical actuation, *J. Am. Soc. Mass Spec.*, **21**, 501-510 (2010).
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71. Green, C., Fedorov, A., and Joshi, Y., Scaling analysis of performance trade-offs in electronics cooling, *IEEE Trans. Comp. Pack. Tech.*, **32** (4), 868-875 (2009).
72. Fedorov, A. and Meacham, J. M., Evaporation-enhanced, dynamically-adaptive air (gas)-cooled heat sink for thermal management of high heat dissipation devices, *IEEE Trans. Comp. Pack. Tech.*, **32** (4), 746-753 (2009).
73. Rykaczewski, K., Henry, M., Kim, S-K., Fedorov, A., Kulkarni, D., Singamaneni, S., McConney, M. E., and Tsukruk, V. V., The effect of the geometry and material properties of a carbon joint produced by electron beam induced deposited on the electrical resistance of a multiwalled carbon nanotube-to-metal contact interface, *Nanotechnology*, **21**, 035202-035214 (2010).
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75. Forbes, T. P., Dixon, R. B., Muddiman, D.C., Degertekin, F.L., and Fedorov, A., Characterization of charge separation in the Array of Micromachined UltraSonic ElectroSpray (AMUSE) ion source for mass spectrometry, *J. Am. Soc. Mass Spec.*, **20**, 1684-1687 (2009).

76. Sahu, V., Joshi, Y., and Fedorov, A., Hybrid solid state/fluidic cooling for hot spot removal, *Nanoscale Microscale Thermophys. Eng.*, **13** (3), 135-150 (2009).
77. Damm, D. L. and Fedorov, A., Batch reactors for hydrogen production: theoretical analysis and experimental characterization, *Ind. & Eng. Chem. Res.*, **48** (12), 5610-5623 (2009).
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79. McLeod, L., Degertekin, F. L., and Fedorov, A., Non-ideal absorption effects on hydrogen permeation through palladium-silver alloy membranes, *J. Membrane Sci.*, **339**, 109-114 (2009).
80. Fedorov, A. and Dresselhaus, M., Harnessing nano power, *Chem. Sci.*, **6**, C41-C48 (2009).
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82. Green, C., Fedorov, A., and Joshi, Y., Fluid-to-fluid spot-to-spreader (F2/S2) hybrid heat sink for integrated chip-level and hotspot-level thermal management, *ASME J. Electronic Packaging*, **131** (2), 025002-09 (2009).
83. Narayanan, S., Fedorov, A., and Joshi, Y., Gas-assisted thin-film evaporation from confined spaces for dissipation of high heat fluxes, *Nanoscale Microscale Thermophys. Eng.*, **13** (1), 30-53 (2009).
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86. Rykaczewski, K., Marshall, A., White, W.B., and Fedorov, A., Dynamic growth of carbon nanopillars and microrings in electron beam induced dissociation of residual hydrocarbons, *Ultramicroscopy*, **108**, 989-992 (2008).
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41. Meacham, J.M., Rourke, A.O., Yang, Y., Fedorov, A. G., Degertekin, F. L., and Rosen, D. W., Experimental characterization of high viscosity droplet ejection, *20th International Solid Freeform Fabrication Symposium – An Additive Manufacturing Conference*, Austin, Texas, USA, August 3-5, 2009 (CD proceedings).

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45. Fedorov, A., Rykaczewski, K., and White, W., Transport issues in focused electron beam chemical vapor deposition, *EuroCVD16*, Hague, The Netherlands, September 16-21, 2007 (CD Proceedings).
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47. Kim, Y. J., Joshi, Y., Fedorov, A., Design of absorption-based miniature heat pump system for cooling high power microprocessors, *InterPack 07*, Vancouver, BC, Canada, July 8-12, 2007 (CD Proceedings).
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54. Damm, D. L. and Fedorov, A., Spectral radiative heat transfer analysis of the planar SOFC, *International Mechanical Engineering Congress & Exposition IMECE'04*, Anaheim, CA, November 13-19, 2004 (CD Proceedings).
55. Fan, T. H. and Fedorov, A., An integrated transport model for tracking of individual exocytotic events using a microelectrode, *Seventh Nanotechnology Conference and Trade Show NANOTECH 2004*, Boston, Massachusetts, March 7-11, 2004 (CD Proceedings).
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59. Murthy, S. and Fedorov, A., Radiation heat transfer analysis of the monolith-type solid oxide fuel cells, *International Mechanical Engineering Congress & Exposition IMECE'03*, Washington, DC, November 16-21, 2003 (CD Proceedings).
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61. Gurrum, S., Suman, S., Joshi, Y., and Fedorov, A., Thermal issues in next generation integrated circuits, *International Electronic Packaging Technical Conference and Exhibition*, Maui, Hawaii, July 6-11, 2003 (CD Proceedings). This paper was nominated for the InterPack03 Best Paper Award.
62. Fan, T. H. and Fedorov, A., Electrohydrodynamic interactions of an AFM tip and a biological membrane, *Sixth Nanotechnology Conference and Trade Show NANOTECH 2003*, Vol. 1, pp. 1-5 & Vol. 3, pp. 376-380, San Francisco, California, February 23-27, 2003.
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C. PRESENTATIONS

- **Conference Presentations (reviewed based on abstract only)**
 1. Anderson, D., Nasr, M., Yun, T., Kottke, P.A., and Fedorov, A., Variable-volume batch-membrane reactors for CO₂ sorption enhanced hydrogen production, *14th International Conference on Microreaction Technology (IMRET)*, Beijing, China, September 12-14, 2016.
 2. Henry, M., Fisher, J., Kim, S., Kottke, P. A., and Fedorov, A., New capabilities for FEBIP using supersonic carrier-gas micro-jet and liquid nanoelectrospray for precursor delivery, *6th FEBIP (Focused Electron Beam Induced Processing) International Workshop*, Vienna, Austria, July 5-8, 2016.
 3. Kim, S. and Fedorov, A., FEBIP of graphene: etching/patterning, doping and contact modification, *6th FEBIP (Focused Electron Beam Induced Processing) International Workshop*, Vienna, Austria, July 5-8, 2016.
 4. Lee, J., Kottke, P.A., Hecht, E., Muddiman, D., Panyala, N., Torres, M., and Fedorov, A., Efficient ion transmission and desolvation enabled by vertical flow in Dry Ion Localization and Locomotion (DRILL) MS interface, *64th ASMS Conference on Mass Spectrometry & Allied Topics*, San Antonio, TX, USA, June 5-9, 2016.
 5. Kim, S., Henry, M., M., Kim, S., Naik, R., Voevodin, A. A., Jang, S., Tsukruk, V. V., and Fedorov, A., Direct-write patterning and dynamic doping of monolayer graphene using focused electron beam induced processing, *Materials Research Society (MRS) Spring 2016 Meeting*, Phoenix, Arizona, March 28-April 1, 2016.
 6. Henry, M., Fisher, J., Kim, S., Kottke, P. A. and Fedorov, A., Using energetic jets to enable new modes of focused electron beam induced processing of nanomaterials, *20th Biennial European Conference on Chemical Vapor Deposition - EuroCVD 20*, Sempach, Switzerland, July 13-17, 2015.
 1. Chilmonczyk, M., Tibavinsky, I., Kottke, P.A. , and Fedorov, A., Fast response microfabricated dialysis-ESI device enabled by monolithic integration, *63rd ASMS Conference on Mass Spectrometry & Allied Topics*, St. Louis, MO, USA, May 31 - June 4, 2015.
 2. Henry, M., Fisher, J., Kim, S., Kottke, P. A. and Fedorov, A., Focused electron beam induced processing via multi-mode energized micro/nano-jets to enable advances in graphene

- nanoelectronics, *59th Conference on Electron, Ion, and Photon Beam Technology and Nanofabrication (EIPBN)*, San Diego, California, May 26-29, 2015.
3. Kim, S., Russell, M., Kulkarni, D., Chyasnachyus, M., Henry, M., Kim, S., Naik, R., Voevodin, A. A., Jang, S., Tsukruk, V. V., and Fedorov, A., Enhanced interfacial properties of graphene-metal junctions with Focused Electron Beam Induced Deposition (FEBID) of graphitic interlayer, *Materials Research Society (MRS) Spring 2015 Meeting*, San Francisco, California, April 6-10, 2015.
 4. Anderson, D., Nasr, M., Yun, T., Kottke, P.A., and Fedorov, A., Sorption-enhanced CHAMP reactor for distributed steam methane reforming, *3rd International Forum on Environment and Energy Science*, ACEEES, Perth, Australia, December 12-16, 2014 (**best presentation award**).
 5. Anderson, D. A., Kottke, P. A., Yun, T., and Fedorov, A. G., Sorption-enhanced variable volume membrane reactor for hydrogen production from methane: modeling and experimental characterization, *2014 AIChE Annual Meeting*, Atlanta, Georgia, November 16-21, 2014.
 6. Fedorov, A., Kim, S., Henry, M., Kulkarni, D., Tsukruk, V. V., Multifunctional FEBIP environment for emerging applications in carbon nanoelectronics and opto-electro-mechanical nanodevice fabrication, *5th FEBIP (Focused Electron Beam Induced Processing) International Workshop*, Frankfurt, Germany, July 22-24, 2014.
 7. Henry, M., Kim, S., and Fedorov, A., Energetic gas jet enhancement of Focused Electron Beam Induced Deposition (FEBID), *Materials Research Society (MRS) Spring 2014 Meeting*, San Francisco, California, April 21-25, 2014.
 8. Kim, S., Kulkarni, D., David, R., Henry, M., Voevodin, A. A., Kim, S., Pacley, S., Jang, S., Tsukruk, V. V., and Fedorov, A., Engineering graphene-metal interface with Focused Electron Beam Induced Deposition (FEBID) of graphitic nanojoints, *Materials Research Society (MRS) Spring 2014 Meeting*, San Francisco, California, April 21-25, 2014.
 9. Anderson, D., Kottke, P.A., and Fedorov, A., Sorption-enhanced CHAMP class reactor for low temperature, distributed hydrogen production from natural gas, *2nd International Education Forum on Environment and Energy Science*, ACEEES, Los Angeles, CA, USA, December 13-17, 2013.
 10. Yun, T., Kottke, P. A., and Fedorov, A., Liquid fuel reformation in variable-volume membrane reactor, *2nd International Education Forum on Environment and Energy Science*, ACEEES, Los Angeles, CA, USA, December 13-17, 2013.
 11. Kottke, P.A., Fedorov, A.G., Thin film evaporative cooling of hot spots, *2013 Power MEMS workshop*, London, UK, December 3-6, 2013.
 12. Anderson, D. A., Kottke, P. A., and Fedorov, A. G., Hydrogen production from natural gas via sorption-enhanced variable volume batch-membrane reactors, *2013 AIChE Annual Meeting*, San Francisco, California, November 3-8, 2013.
 13. Silva, J., Geryak, R., Kottke, P.A., Anderson, D.M., Tsukruk, V. V., Naik, R. and Fedorov, A., Thermomechanical behavior of a constrained gel interface for heat and moisture management, *International Mechanical Engineering Congress & Exposition IMECE'13*, San Diego, CA, November 15-21, 2013.
 14. Kottke, P.A., Tibavinsky, I., Fedorov, A., Scanning Mass Spectrometry (SMS) Probe: towards an *in vivo* imaging mass spectrometry system for discovery of disease signatures, *Materials Research Society (MRS) Spring 2013 Meeting*, San Francisco, California, April 1-5, 2013.

15. Kim, S., Kulkarni, D., Tsukruk, V.V., Fedorov, A., Graphitic EBID carbon interfaces between MWCNT/graphene and metal electrodes, *Materials Research Society (MRS) Spring 2013 Meeting*, San Francisco, California, April 1-5, 2013.
16. Anderson, D. and Fedorov, A., Improved CHAMP-class reactors enabling a sustainable route to hydrocarbon processing for mobile and distributed power generation, *1st International Education Forum on Environment and Energy Science*, ACEEES, Hawaii, December 14-18, 2012.
17. Yun, T., Kottke, P. A., and Fedorov, A., CHAMP-DDIR: high power density fuel reforming reactor for hydrogen generation, *1st International Education Forum on Environment and Energy Science*, Hawaii, ACEEES, December 14-18, 2012.
18. Kottke, P.A., Anderson, D.M., and Fedorov, A., Condensation enhancement with micro- and nano-structured amphiphilic surfaces, *2012 Power MEMS workshop*, Atlanta, GA, December 2-5, 2012.
19. Narayanan, S., Fedorov, A., and Joshi, Y., Managing hot spots on chips via gas assisted thin film evaporation from confined spaces, *International Mechanical Engineering Congress & Exposition IMECE'12*, Houston, TX, November 9-15, 2012.
20. Yun, T. M., Kottke, P. A., and Fedorov, A. G., DDIR-CHAMP: high power density fuel reforming reactor for hydrogen generation, 2012 AIChE Annual Meeting, Pittsburg, Pennsylvania, October 28-November 2, 2012.
21. Kim, S., Kulkarni, D., Rykaczewski, K., Henry, M. R., Tsukruk, V.V. and Fedorov, A., Application of FEBID to carbon nanotube-based interconnect fabrication, *4th FEBIP (Focused Electron Beam Induced Processing) International Workshop*, Zaragoza, Spain, June 20-21, 2012.
22. Henry, M. R., Kim, S., Rykaczewski, K., and Fedorov, A., Using energetic inert gas jets to enable new modes of focused electron beam induced deposition (FEBID), *4th FEBIP (Focused Electron Beam Induced Processing) International Workshop*, Zaragoza, Spain, June 20-21, 2012.
23. Ogden, A. D., Gole, J. L., and Fedorov, A., Hybrid nanostructured TiO₂ electrodes for photocatalytic hydrogen production, *4rd International Forum on Multidisciplinary Research and Education in Energy Sciences*, Honolulu, Hawaii, December 17-22, 2011.
24. Anderson, D., Gupta, M., Voevodin, A., Hunter, C., S. A. Putnam, Tsukruk, V.V., and Fedorov, A., Control water condensation in energy systems using nanostructured surfaces, *4rd International Forum on Multidisciplinary Research and Education in Energy Sciences*, Honolulu, Hawaii, December 17-22, 2011.
25. Kulkarni, D., Kim, S.K., Fedorov, A., and Tsukruk, V., On the contact resistance of the carbon nanotube-metal interfaces, *Materials Research Society (MRS) Fall 2011 Meeting*, Boston, Massachusetts, November 28-December 2, 2011.
26. Rykaczewski, K., Hildreth, O.J., Wong, C.P., Fedorov, A., and Scott, J. H. J., Guided self-assembly of 3D catalyst structures during metal assisted chemical etching of silicon, *Materials Research Society (MRS) Fall 2011 Meeting*, Boston, Massachusetts, November 28-December 2, 2011.
27. Rykaczewski, K., Scott, J. H. J., Fedorov, A., Electron beam heating effects during in-situ ESEM imaging of water condensation on superhydrophobic surfaces, *Microscopy & Microanalysis 2011*, Nashville, Tennessee, August 7-11, 2011.

28. Rykaczewski, K., Fedorov, A., Scott, J. H. J., Nano-to-micro scale water droplet growth dynamics during condensation on superhydrophobic surfaces, *Materials Research Society (MRS) Spring 2011 Meeting*, San Francisco, California, April 25-29, 2011.
29. Rykaczewski, K., Hildreth, O.J., Wong, C.P., Fedorov, A., and Scott, J. H. J., 3D silicon nanostructures fabrication via thin film focused ion beam milling in combination with metal assisted chemical etching, *Materials Research Society (MRS) Spring 2011 Meeting*, San Francisco, California, April 25-29, 2011.
30. Rosen, D., Degertekin, F. L., Fedorov, A., Loney, D., Zhou, W., Drop-on-demand deposition of complex fluids for 3D manufacturing, *NSF CMMI Research & Innovation Conference "Engineering for Sustainability and Prosperity"*, Atlanta, GA, USA, January 4-7, 2011.
31. Ogden, A. D., Gole, J. L., and Fedorov, A., Hybrid nanostructured TiO₂ electrodes for photocatalytic hydrogen production, *3rd International Forum on Multidisciplinary Research and Education in Energy Sciences*, Ishigaki-jima, Okinawa, Japan, December 9-14, 2010.
32. Siegel, K. A., Varady, M., and Fedorov, A., Transient catalytic reactors for on-board hydrogen production, *3rd International Forum on Multidisciplinary Research and Education in Energy Sciences*, Ishigaki-jima, Okinawa, Japan, December 9-14, 2010.
33. Sahu, V., Joshi, Y. K., and Fedorov, A., Superlattice coolers for dynamic thermal management of microprocessor hotspots, *IMAPS Advanced Technology Workshop on Thermal Management*, Palo Alto, California, September 28-30, 2010.
34. Rykaczewski, K., Hildreth, O.J., Wang, C. P., Fedorov, A., Scott, J. H. J., and Maslar, J. E., Maskless and Resist-Free Rapid Prototyping of Integrated Insulator, Semiconductor, and Conductor Three Dimensional Structures with Rotational Geometry through Electron Beam Induced Deposition (EBID) of Carbon and Focused Ion Beam (FIB) Induced Deposition of Platinum in Combination with Metal-Assisted Chemical Etching (MACE) of Silicon, *Materials Research Society (MRS) Fall 2010 Meeting*, Boston, Massachusetts, November 29-December 3, 2010.
35. Rykaczewski, K., Kulkarni, D., Henry, M., Kim, S.-K., Tsukruk, V.V., and Fedorov, A., Theoretical and experimental investigation of formation and resulting properties of Electron Beam Induced Deposited (EBID) of a carbon MWNT-to-metal interface, *Materials Research Society (MRS) Spring 2010 Meeting*, San Francisco, California, April 5-9, 2010.
36. Kulkarni, D., Singamaneni, S., Tsukruk, V.V., Rykaczewski, K., and Fedorov, A., Physical properties of Electron beam induced deposited (EBID) carbon - Multiwalled carbon nanotube (MWNT) - metal interface, *Materials Research Society (MRS) Spring 2010 Meeting*, San Francisco, California, April 5-9, 2010.
37. Rykaczewski, K. and Fedorov, A., Focused electron beam deposition (EBID) of nanomaterials: multiscale simulations, surprising behavior trends, and promising applications, *International Mechanical Engineering Congress and Exposition (IMECE-2009), Symposium on Multiphysics Simulations of Solids*, Lake Buena Vista, Florida, November 13-19, 2009 (invited).
38. Dietz, C., Rykaczewski, K., Fedorov, A., and Joshi, Y., ESEM imaging of condensation on a nanostructured, superhydrophobic surface, *International Mechanical Engineering Congress and Exposition (IMECE-2009)*, Lake Buena Vista, Florida, November 13-19, 2009.

39. McLeod, L., Degertekin, F. L., and Fedorov, A., Hydrogen permeation across Nanostructured Pd/Ag alloy membranes: Ward-and-Dao model revisited, *5th International Conference on Diffusion in Solids and Liquids – Mass Transfer, Heat Transfer and Microstructure and Properties, DSL-2009*, Rome, Italy, June 24-26, 2009.
40. Rykaczewski, K., and Fedorov, A., Electron beam induced deposition (EBID) of carbon interface between a carbon nanotube interconnect and metal electrode, *Materials Research Society (MRS) Spring 2009 Meeting*, San Francisco, California, April 13-17, 2009.
41. Mehrabadi, M., Kottke, P.A., and Fedorov, A., A Model for the dynamics of membrane deformation in exocytosis, *82nd ACS Colloid and Surface Science Symposium*, Rayleigh, North Carolina, USA, June 15-18, 2008.
42. Damm, D. L., and Fedorov, A., Forced unsteady-state, variable volume membrane reactor: new scalable technology for distributed hydrogen production, *3rd ASME Energy Nano Conference*, Jacksonville, Florida, August 10-14, 2008.
43. McLeod, L., Degertekin, F. L., and Fedorov, A., Grain boundary diffusion of hydrogen in nanostructured Pd/Ag alloy membranes, *3rd ASME Energy Nano Conference*, Jacksonville, Florida, August 10-14, 2008.
44. Hampton, C. Y., Forbes, T. P., Varady, M. J., Meacham, J. M., Silvestri, C. J., Degertekin, F. L., Fedorov, A., and Fernandez, F. M., Internal energy deposition in ionization by the Venturi-assisted array of micromachined ultrasonic electrospays (AMUSE) for mass spectrometry, *59th Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy (Pittcon 2008)*, New Orleans, Louisiana, USA, March 1-7, 2008.
45. Fedorov, A. and Jain, A., DRILL: Atmospheric pressure confining/focusing vortex flow structure and method of generating/transmitting dry ions from ion source to mass analyzer, *56th ASMS Conference on Mass Spectrometry*, Denver, Colorado, USA, June 1-5, 2008.
46. Kottke P.A., Degertekin, F.L., and Fedorov, A., Reverse-Taylor-Cone electro spray ionization for transient imaging in solution, *56th ASMS Conference on Mass Spectrometry*, Denver, Colorado, USA, June 1-5, 2008.
47. Forbes, T.P., Dixon, R. B., Muddiman, D. C., Degertekin, F.L., and Fedorov, A., Exploring mechanisms of analyte ionization in AMUSE (Array of Micromachined UltraSonic Electro spray) ion source combined with an FT-ICR mass spectrometer, *56th ASMS Conference on Mass Spectrometry*, Denver, Colorado, USA, June 1-5, 2008.
48. Hampton, C. Y., Silvestri, C. J., Forbes, T. P., Varady, M. J., Meacham, J. M., Degertekin, F. L., Fedorov, A., and Fernandez, F. M., Internal energy deposition of a Venturi-assisted micromachined array of ultrasonic electrospays, *56th ASMS Conference on Mass Spectrometry*, Denver, Colorado, USA, June 1-5, 2008.
49. Dixon, R. B., Edwards, J.R., Fedorov, A., Hawkridge, A. M., and Muddiman, D. C., Improved ion abundance in LTQ and LTQ-FT-ICR mass spectrometry by implementing an air amplifier, *ACS Southeastern Regional Meeting*, Greenville, South Carolina, USA, October 24-27, 2007.
50. Meacham, J. M., Zarnitsyn, V., Varady, M., Atencia, J., Locascio, L., Degertekin, F. L., and Fedorov, A., Fabrication of a disposable electrosonic microarray in thiolene and performance characterization for biomolecule delivery, *μ TAS 2007 Conference*, Paris, France, October 7-11, 2007.

51. Hampton, C. Y., Forbes, T. P., Varady, M. J., Meacham, J. M., Silvestri, C. J., Degertekin, F. L., Fedorov, A., and Fernandez, F. M., Stability and internal energy deposition of a Venturi-assisted micromachined array of ultrasonic electrospays for mass spectrometry, *FACSS (Federation of Analytical Chemistry and Spectroscopy Societies) Annual Conference*, Memphis, Tennessee, USA, October 14-18, 2007.
52. Ogden, A., Gole, J. L., and Fedorov, A., Synthesis and characterization of TiO₂-xNx nanostructures for visible light photocatalytic hydrogen production, *2nd ASME Energy Nano Conference*, Santa Clara, California, September 5-7, 2007.
53. Damm, D. L., and Fedorov, A., CHAMP: Scalable technology for distributed hydrogen production and CO₂ capture, *2nd ASME Energy Nano Conference*, Santa Clara, California, September 5-7, 2007.
54. Damm, D. L., and Fedorov, A., CO₂ capture and sustainable carbon economy, *2nd ASME Energy Nano Conference*, Santa Clara, California, September 5-7, 2007.
55. Fernandez, F. M., Hampton, C. Y., Forbes, T. P., Meacham, J. M., Dixon, R. B., Muddiman, D. C., Degertekin, F. L., and Fedorov, A., Characterization of ion generation by a Venturi-assisted array of micromachined ultrasonic electrospays, *55th ASMS Conference on Mass Spectrometry*, Indianapolis, Indiana, USA, June 3-7, 2007.
56. Forbes, T. P., Hampton, C. Y., Meacham, J. M., Fernandez, F. M., Degertekin, F. L., Dixon, R. B., Muddiman, D. C., and Fedorov, A., AMUSE (Array of Micromachined UltraSonic ElectroSpray) ion source for high throughput, multiplexed bioanalytical mass spectrometry, *Third US-HUPO Symposium: Mapping the Humane Proteome – From Tools to Functionality*, Seattle, Washington, USA, March 5-8, 2007.
57. Fedorov, A., Degertekin, F. L., and Kottke, P. A., Combined Scanning Mass Spectrometry–Atomic Force Microscopy (SMS-AFM) probe: A new tool for biochemical and topographical imaging, *18th Sanibel Conference on Mass Spectrometry*, Sanibel Island, Florida, January 19-22, 2007 (poster).
58. Papania, M., Mair, R., Meacham, J.M., Fedorov A., Degertekin L., Rota P., Methods to assess potency of aerosolized live attenuated viral vaccines, *16th Congress of International Society for Aerosols in Medicine*, Tours, France, June 16-20 (2007) (**best oral presentation award**).
59. Sun, L., White, W. B., Rykaczewski, Wingkono, G. A., Fedorov, A., and T. M. Orlando, Focused electron beam chemical vapor deposition of a periodic silicon carbide nano-pattern, *Materials Research Society (MRS) Fall 2006 Meeting*, Boston, Massachusetts, November 28-30, 2006.
60. Varady, M., McLeod, L., Meacham, J. M., Degertekin, F. L., and Fedorov, A., Integrated MEMS infrastructure for fuel processing, hydrogen generation and separation for portable power generation, *PowerMEMS 2006 Workshop*, Berkeley, CA, November 29-December 1, 2006.
61. Zarnitsyn, V.G. and Fedorov, A., Hydrodynamic interactions during AFM imaging of biological cells: can AFM truly resolve a lipid membrane position?, *AIChE Fall Annual Meeting*, San Francisco, CA, November 12-17, 2006.
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78. Kaisare, N., Fedorov, A., and Lee, J. H., Hydrogen generation in a microchannel reactor with periodic flow reversal: simulation and analysis, *2004 AIChE Annual Meeting*, Austin, Texas, USA, November 7-12, 2004.
79. Meacham, J. M., Varady, M., Degertekin, F. L., and Fedorov, A., Droplet formation and ejection from a micromachined ultrasonic droplet generator: visualization and scaling, *Transport Phenomena in Micro and Nano Devices*, Engineering Conferences Foundation, Hawaii, USA, October 17-21, 2004.
80. Damm, D. and Fedorov, A., Radiation heat transfer in SOFC materials and components, *ASM Symposium on Fuel Cells Materials, Processing, and Manufacturing Technologies*, ASM International, Columbus, Ohio, USA, October 18-21, 2004.
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86. Fan, T. H. and Fedorov, A., Visualization of fluid-fluid Interfaces and their Interactions in a slowly rising, viscous multicomponent droplet, *Photogallery of Transport Phenomena, 2002 International Mechanical Engineering Congress & Exposition IMECE'00*, New Orleans, Louisiana (November 17-22, 2002).
87. Kikas, T., Zhang, H., Bardenshteyn, I. M., Ejimofor, C. Puri, P., Phillips, C., and Fedorov, A., Feedstock for micro fuel cells: efficient hydrogen production in the reverse-flow autothermal catalytic microreactors with fractal structuring of catalytically active surface, *International Symposium on*

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 89. Fedorov, A., Radiative transfer in closed cell foams, *Open Forum on Radiative Heat Transfer*, 34th *National Heat Transfer Conference*, Pittsburgh, PA (August 21, 2000).
- **Keynote Lectures, Invited Seminars & Presentations**
 1. *Evaporative Cooling at Extremes – Ultra-High Pressures, Ultra-Small Gaps and Ultra-Large Mass Fluxes – Above and Beyond 1 kW/cm²*. Gordon Research Conference (GRC) on "Micro and Nanoscale Phase Change Heat Transfer", Galveston, TX, USA (January 8-13, 2017).
 2. *Emerging Micro/Nanotechnologies using Focused Electromechanical Fields for Drop-on-Demand Bioanalytics*. Mechanical Engineering Department, Columbia University, New York City, New York, USA (October 7, 2016).
 3. *Exploiting Nanoscale Confinement for Design of Optimal Evaporation/Condensation Interface*. Mechanical Engineering Department, University of Minnesota, Twin Cities, USA (October 5, 2016).
 4. *Extreme Capabilities for Biomedical Diagnostics Enabled by Integration of Micro/Nanotechnologies*. CDC/Emory/Emory/Morehouse School of Medicine(MSM) Nanotechnology Day, Georgia Tech's Institute of Electronics & Nanotechnology, USA (July 14, 2016).
 5. *"Walking the Feynman's Talk" – Focused Electron Beam "Direct-Write" Processing of CNT, Graphene and Graphene Oxide Electronic Devices*. Mechanical Engineering Department, University of California at Berkeley, USA (March 18, 2016).
 6. *"Walking the Feynman's Talk" – Using Focused Electron Beam for Direct-Write Nanofabrication of CNT, Graphene and Graphene Oxide Electronic Devices*. Birck Nanotechnology Center, Purdue University, West Lafayette, Indiana, USA (November 25, 2015).
 7. *Using Multi-Phase Energetic Jets to Achieve Understanding of Precursor-Surface Interactions and Enable New Modes of Focused Electron Beam Processing (FEBIP) of 2D & 3D Nanomaterials and Heterogeneous Interfaces*, Invited presentation at Department of Energy (DOE) Basic Energy Sciences (BES) Synthesis & Processing Science Program, Gaithersburg, MD (November 2-4, 2015).
 8. *Exploiting Nanoscale Confinement for Design of Optimal Evaporation/Condensation Interface*, IX Keynote lecture at the IX International Conference on "Heat Pipes, Heat Pumps, Refrigerators, Power Sources", Minsk, Belarus (September 7–10, 2015).
 9. *New Ideas in Fuel Reforming and Hydrogen Generation for Distributed, Mobile and Portable Applications*. Academy for Co-creative Education of Environment and Energy Science (ACEEES), Tokyo Institute of Technology, Tokyo, Japan (June 16, 2015).
 10. *Emerging Micro/Nanotechnologies using Focused Electromechanical Fields for Drop-on-Demand Bioanalytics*. Mechanical Engineering Department, Stanford University, Palo Alto, California, USA (April 8, 2015).

11. *Electron Beam Induced Deposition (EBID) of Graphitic NanoJoints for Graphene Interconnects*, Global Research Collaboration (GRC) Invited e-Workshop, Semiconductor Research Corporation (SRC) (November 6, 2014).
12. *Matching Demand & Supply in Cooling of High Performance Microprocessors: From Scaling Laws to Device Applications*, Porous Media Laboratory, Luikov Institute for Heat and Mass Transfer, Minsk, Belarus (January 23, 2014).
13. *Microdevices for Phase-Change Cooling of High Performance Electronics*, Power Engineering Department, Bauman Moscow State Technical University, Moscow, Russia (January 17, 2014).
14. *Micro/Nano-Fluidic Devices Based on Focused Electromechanical Fields for Large Biomolecule Delivery, Sensing, and Imaging*, IBB Breakfast Club Seminar Series, Petit Institute for Bioengineering and Bioscience, Georgia Institute of Technology, Atlanta, Georgia, USA (January 14, 2014).
15. *Exploiting Nanoscale Confinement for Design of Optimal Evaporation/Condensation Interface*, Department of Mechanical Engineering, University of Nevada, Las Vegas, USA (September 23, 2013).
16. *Focused Electron Beam Induced Processing (FEBIP) for Emerging Carbon-Based Electronic Nanomaterials*. Intel/SRC Symposium and Executive Review, Hillsboro, Oregon, USA (September 5, 2013).
17. *Thin Film Evaporation – Overview: Focusing on Micro/Nano Structures for Phase-Change Heat Transfer*. NSF/DARPA/ONR/ARPA-E International Workshop on “Micro and Nano Structures for Phase Change Heat Transfer”, MIT, Boston, Massachusetts, USA (April 22-23, 2013).
18. *New Ideas in Fuel Reforming and Hydrogen Generation for Distributed, Mobile and Portable Applications*. American Chemical Society (ACS) Symposium on “Hydrogen Production, Storage, and Utilization”, 245th ACS National Meeting, New Orleans, LA (April 7-11, 2013).
19. *Evaporation and Condensation within Nanoscale Confined Domains: Old Problems, New Ideas, and Critical Applications*. Department of Mechanical Engineering and Materials Science, Duke University, Durham, North Carolina, USA (January 23, 2013).
20. *Drop-on-Demand Bioanalytics using Focused Electromechanical Fields*, Keynote lecture at 2012 IEEE NANOMED (IEEE International Conference on Nano/Molecular Medicine & Engineering), Bangkok, Thailand (November 4-7, 2012).
21. *Focused Electron Beam Induced Deposition (FEBID): Unresolved Problems, New Ideas, and Emerging Applications*. Invited Lecture and Master Workshop, Nanotools/Scanning Probes GmbH, Munich, Germany (October 13-16, 2012).
22. *Matching Demand & Supply in Cooling of High Performance Microprocessors: From Scaling Laws to Device Applications*. Air Force Research Labs (AFRL), Dayton, Ohio, USA (September 18, 2012).
23. *Bridging the Gap between Energy & Sustainability – Unlocking a Potential for Smooth Transition to Sustainable Energy Management in Transportation & Removing Critical Bottlenecks in Renewable Energy Technologies*. Keynote lecture at the 5th International Forum on Multidisciplinary Education and Research for Energy, Tokyo Institute of Technology, Tokyo, Japan (September 7, 2012).
24. *“Walking the Feynman’s Talk” – Using Focused Electrons for 3D Nanomanufacturing to Enable Critical Applications*. Mechanical, Aerospace & Biomedical Engineering Department, University of Tennessee Knoxville, Tennessee, USA (April 19, 2012).

25. *Technological Challenges and Opportunities for Carbon Capture and Sequestration*, National Power Plant Management Summit (by invitation only forum for Plant Managers, Plant Superintendents, VPs and Directors of Power Generation), Wheeling, Illinois, USA (October 17-19, 2011).
26. *Surely You're NOT Joking Mr. Feynman: "Walking the Talk" from Quazi-2D Microfabrication to Fully-3D Nanomanufacturing to Enable Critical Applications*. Opening Keynote lecture at International Symposium on Nano/Micro Fabrication for Energy Science and Technology, Organized by a Consortium of Tokyo Institute of Technology/University of Tokyo/Keio University/Waseda University, Kawasaki City, Japan (March 4, 2011).
27. *Opportunities CO₂ Capture from Transportation and Distributed Sources and Enabling Technologies with "Sustainability" Potential*, Keynote lecture at the Saudi Aramco Technology Symposium "Technologies for Reducing CO₂ Emissions from Transportation Sectors and CO₂ Utilization", Houston, Texas, USA (October 11, 2010).
28. *Electron Beam Induced Deposition (EBID): Role of Mass/Heat Transfer, Deposition Scaling Laws, and Applications to 3D Nanomanufacturing*, Keynote lecture at FEBIP 2010 (International Workshop on Focused Electron Beam Induced Processing), Albany, NY, USA (July 15-16, 2010).
29. *Towards Sustainable "Carbon Economy" for Transportation - Enabling Technologies for Distributed H₂/Power Generation with CO₂ Capture*, Mechanical & Aerospace Engineering Department, University of Notre Dame, Indiana, USA (March 16, 2010).
30. *Technology Options for CO₂ Capture from Transportation and Distributed Sources*, Technology & Policy Briefing to British American Parliamentary Group, Atlanta, Georgia, USA (February 18, 2010).
31. *Feasibility and Technology Options for CO₂ Capture from Transportation and Distributed Sources*, Open Forum on Energy and Environment "The Impact of CO₂ on Global Climate Change", Georgia Institute of Technology, Atlanta, Georgia, USA (November 5, 2009).
32. *Electron Beam CVD-A New Tool for 3-D Nanomanufacturing: Underlying Fundamentals, Unexpected Behavior Trends, and Promising Applications*, Mechanical Engineering Department, University of Connecticut, Storrs, Connecticut, USA (October 8, 2009).
33. *(Electro)Chemical Imaging of Biochemical Interfaces – Enabling Tools for Systems Biology Research: Physical Methods and Mathematical Challenges*, IBSI (Integrated BioSystems Institute), Georgia Institute of Technology, Atlanta, Georgia, USA (March 4, 2009).
34. *Carbon Capture and Sequestration*, National Conference of State Legislatures, Agriculture and Energy Committee, Atlanta, Georgia, December 12, 2008.
35. *Transient (Electro)Chemical Imaging of Reacting Interfaces: Physical Concepts and Mathematical Challenges*, Mathematical Biology and Ecology Seminar, Georgia Institute of Technology, Atlanta, Georgia, USA (December 3, 2008).
36. *Thermodynamic and Thermal Transport Challenges in Energy Technologies Enabling Sustainable Transportation*, Panel "Future Directions on Renewable and Sustainable Energy Research", ASME Summer Heat Transfer Conference, Jacksonville, Florida, August 10-14, 2008.
37. *Electron Beam CVD-A New Tool for 3-D Nanomanufacturing: Underlying Fundamentals, Unexpected Behavior Trends, and Promising Applications*, Nanoparticle Science and Engineering Seminar Series, University of Minnesota, Twin Cities Campus, Minneapolis, Minnesota, USA (February 1, 2008).

38. *Towards Sustainable "Carbon Economy" - Enabling Technologies for H₂/Power Generation with CO₂ Capture*, Mechanical Engineering Seminar Series, University of Illinois at Urbana-Champaign, Illinois, USA (October 16, 2007).
39. *CO₂ Capture and Sustainable Carbon Economy*, 2nd ASME International Energy Nanotechnology Conference, Santa Clara, California, September 5-7, 2007.
40. *Electrosonic DNA Gun Microarray for Drug and Gene Delivery*, Integrative BioSystems Institute (IBSI) Conference, Georgia Institute of Technology, Atlanta, Georgia, USA (March 14, 2007).
41. *Small Scale Fuel Processing for Portable Power Generation*, Mechanical Engineering Seminar Series, University of Minnesota, Twin Cities Campus, Minneapolis, Minnesota, USA (October 18, 2006).
42. *Miniaturized Refrigeration Systems for Sub-Ambient Cooling of Electronics*, IFC Workshop on Thermal Management & Power Delivery, MARCO/DARPA Interconnect Focus Center, Georgia Tech, Atlanta, Georgia, USA (May 1, 2006).
43. *AMUSE (Array of Micromachined UltraSonic ElectroSprays) for Bioanalytical Mass Spectrometry*, Mass Spectrometry Seminar Series, Department of Chemistry, University of Georgia, Athens, Georgia, USA (March 3, 2006).
44. *AMUSE (Array of Micromachined UltraSonic ElectroSprays) for Bioanalytical Mass Spectrometry*, Department of Mechanical and Aerospace Engineering, University of California at Los Angeles (UCLA), Los Angeles, California, USA (January 27, 2006).
45. *AMUSE (Array of Micromachined UltraSonic ElectroSprays) for Bioanalytical Mass Spectrometry*, Department of Mechanical Engineering, Massachusetts Institute of Technology (MIT), Boston, Massachusetts, USA (December 7, 2005).
46. *Transport and Chemical Processing on Small Scales*, Milliken and Company, Spartanburg, South Carolina, USA (June 27, 2005)
47. *Radiative Heat Transfer in SOFC Materials and Components*, Academician Leontiev's School-Seminar "Heat Transfer and Hydrodynamics in Power Generation", Russian Academy of Sciences, Kaluga, Russia (May 24, 2005).
48. *Small Scale Fuel Processing for Portable Power Applications*, Center for Fuel Cells and Battery Technologies, Georgia Institute of Technology, Atlanta, Georgia, USA (February 16, 2005).
49. *Exciting Vistas at Intersection of Materials and Nanotechnology*, Materials Council Nanomaterials Forum, Georgia Institute of Technology, Atlanta, Georgia, USA (December 16, 2004).
50. *Glass Foams: Formation, Transport Properties, and Mechanisms of Heat and Mass Transfer*, Johns Manville Inc. R&D Technical Center, Littleton, Colorado, USA (June 28, 2004).
51. *Micromachined Acoustic μ -Atomizer for Mist Impingement Cooling of High Performance Electronics*, Sandia National Laboratories, Albuquerque, New Mexico, USA (April 8, 2004).
52. *From Nanostructures to Porous Silicon: Sensors and Photocatalytic Reactors*, NanoSemiMat-03, Cooperative Network for Research on Semiconductor Nanodevices and Nanostructured Materials, Universidade Federal de Pernambuco, Salvador, Brasil (March 25-26, 2004).
53. *AFM Imaging of Biological Membranes: Optimal Operation and Data Interpretation Through Understanding of Transport Phenomena*, Purdue Heat Transfer Celebration, Purdue University, West Lafayette, Indiana (April 4-6, 2003).

54. *From Energy to Environment: Unique Opportunities in Nanoscale Catalysis*, US-Japan Nanotherm Seminar: Nanoscale Thermal Science and Engineering, Berkeley-Stanford, California (June 24-26, 2002).
55. *Thermal Management Strategies for Next Generation Electronics*, Interconnect Focus Center, Georgia Institute of Technology, Atlanta, Georgia, USA (April 9, 2002).
56. *Thermal/Fluid Aspects of Materials Processing and Manufacturing*, School of Material Science and Engineering, Georgia Institute of Technology, Atlanta, Georgia, USA (March 26, 2002).
57. *Radiative Transfer in a Semitransparent Hemispherical Shell*, International Centre for Heat and Mass Transfer, Antalya, Turkey (June, 2001).
58. *Transport Phenomena in Chemical Microreactors*, Integrated Sensing, System Identification, and Control Laboratory, School of Chemical Engineering, Georgia Institute of Technology, Atlanta, Georgia, USA (March 12, 2001).
59. *Transport Phenomena in Glass Manufacturing*, Schott Glas, Inc., Mainz, Germany (February 7, 2001).
60. *Thermal/Fluid Aspects of Materials Processing and Manufacturing*, MicroCoating Technologies, Inc., Chamblee, Georgia, USA (October 12, 2000).
61. *Thermal/Fluid Aspects of Materials Processing and Manufacturing*, Mechanics of Materials Research Group Seminar, G. W. Woodruff School of Mechanical Engineering, Georgia Institute of Technology, Atlanta, Georgia, USA (October 6, 2000).
62. *Thermal/Fluid Aspects of Materials Processing and Manufacturing*, Manufacturing Research Group Seminar, G. W. Woodruff School of Mechanical Engineering, Georgia Institute of Technology, Atlanta, Georgia, USA (June 9, 2000).
63. *Transport Phenomena in Chemical Processing and Reaction Systems*, Specialty Separation Center (SSC) Seminar, School of Chemical Engineering, Georgia Institute of Technology, Atlanta, Georgia, USA (February 23, 2000).
64. *Thermal System Design: Integration of Fundamental Thermal/Fluid Analysis with Process Optimization and Control*, Mechanical Engineering Seminar, Georgia Institute of Technology, Atlanta, Georgia, USA (May 25, 1999).
65. *Radiative Transfer in Glass Foams*, Argonne National Laboratory, Chicago, Illinois, USA (October 12, 1999).
66. *Heat and Mass Transfer Dynamics in the Microchannel Adsorption Reactor*, Heat Transfer Seminar, School of Mechanical Engineering, Purdue University, West Lafayette, Indiana, USA (February 25, 1999).
67. *Heat and Mass Transfer and Adsorption Dynamics in a Honeycomb Adsorbent: Application of the Simplified Local Density Model*, 45th Oji International Seminar, Hokkaido University, Sapporo, Japan (September 16, 1997).
68. *Heat and Mass Transfer and Adsorption/Desorption Dynamics*, Mathematical Modeling and Control Seminar Series, Department of Power Engineering and Control, Urals State Technical University, Ekaterinburg, Russia (July 5, 1997).

69. *Combined Heat and Mass Transfer and Adsorption Dynamics in the Honeycomb Adsorbent*, Heat Transfer Seminar, School of Mechanical Engineering, Purdue University, West Lafayette, Indiana, USA (November 12, 1996).

D. OTHER SCHOLARLY ACCOMPLISHMENTS

- **Utility (Full) Patents and Applications**

1. Fedorov, A. G. and Degertekin, F. L., "*Electrospray Systems and Methods*", U.S. Patent No. 7,208,727, Issued 04/2007.
2. Degertekin, F.L. and Fedorov, A. G., "*Integrated Micro Fuel Processor and Flow Delivery Infrastructure*," U.S. Patent No. 7,312,440, Issued 12/2007.
3. Fedorov, A. G. and Degertekin, F. L., "*Reverse-Taylor-Cone Ionization Systems and Methods of Use Thereof*", U.S. Patent No. 7,411,182, Issued 08/2008.
4. Fedorov, A. G., "*Scanning Ion Probe Systems and Method of Use Thereof* ", U.S. Patent No. 7,442,927, Issued 10/28/2008.
5. Launay, S., Fedorov, A. G., and Joshi, Y., "*Thermal Management Devices, Systems, and Methods*", U.S. Patent No. 7,532,467, Issued 06/2009.
6. Fedorov, A. G., "*Nano-Patch Thermal Management Devices, Methods, and Systems*", U.S. Patent No. 7,545,644, Issued 06/2009.
7. Fedorov, A. G. and Degertekin, F. L., "*Electrospray Systems and Methods*", U.S. Patent No. 7,557,342, Issued 07/2009.
8. Fedorov, A. G., "*Confining/Focusing Vortex Flow Transmission Structure, Mass Spectrometry Systems, and Methods of Transmitting Particles, Droplets, and Ions*", U.S. Patent No. 7,595,487, Issued 09/2009.
9. Fedorov, A. G., Wadell, R., and Launay, S., "*Vortex Tube Refrigeration Systems and Methods*", U.S. Patent No. 7,669,428, Issued 03/2010.
10. Fedorov, A. G., "*Scanning Ion Probe Systems and Method of Use Thereof* ", U.S. Patent No. 7,705,299, Issued 04/2010.
11. Fedorov, A. G. and Degertekin, F. L., "*Electrosonic Cell Manipulation Device and Methods of Use Thereof*", U.S. Patent No. 7,704,743, Issued 04/2010.
12. Degertekin, F.L. and Fedorov, A. G., "*Integrated Micro Fuel Processor and Flow Delivery Infrastructure*," U.S. Patent No. 7,714,274, Issued 05/2010.
13. Fedorov, A. G. and Degertekin, F. L., "*Reverse-Taylor-Cone Ionization Systems and Methods of Use Thereof*", U.S. Patent No. 7,880,148, Issued 02/2011.
14. Fedorov, A.G., Varady, M., and Degertekin, F. L., "*Droplet Impingement Chemical Reactors and Methods of Processing Fuel*", U.S. Patent No. 7,909,897, Issued 03/2011.
15. Fedorov, A. G. and Damm, D. L., "*Hydrogen-Generating Reactors and Methods*", U.S. Patent No. 7,981,171, Issued 07/2011
16. Fedorov, A. G. and Degertekin, F. L., "*Electrospray Systems and Methods*", U.S. Patent No. 7,989,763, Issued 08/2011.
17. Fedorov, A. G., "*Fluid-to-Fluid Spot-to-Spreader Heat Management Devices and Systems and Methods of Managing Heat* ", U.S. Patent No. 8,082,978, Issued 12/2011.

18. Fedorov, A. G. and Rykaczewski, K., "*Electron Beam Induced Deposition of Interface to Carbon Nanotube*", U.S. Patent No. 8,207,058, Issued 06/2012.
19. Fedorov, A. G. and Degertekin, F. L., "*Electrosonic Cell Manipulation Device*", U.S. Patent No. 8,334,133, Issued 12/2012.
20. Fedorov, A. G., "*Foldable Hydrogen Storage Media and Methods*", U.S. Patent No. 8,372,947, Issued 02/2013.
21. Fedorov, A. G., Green, C., Joshi, Y. K., "*Devices Including Composite Thermal Capacitors* ", U.S. Patent No. 8,378,453, Issued 02/2013.
22. Fedorov, A. G. and Rykaczewski, K., "*Electron Beam Induced Deposition of Interface to Carbon Nanotube*", U.S. Patent No. 8,531, 029, Issued 09/2013.
23. Fedorov, A.G., Varady, M., and Degertekin, F. L., "*Droplet Impingement Chemical Reactors and Methods of Processing Fuel*", U.S. Patent No. 8,603,205, Issued 12/2013.
24. Fedorov, A. G., Green, C., Joshi, Y. K., "*Devices Including Composite Thermal Capacitors* ", U.S. Patent No. 8,710,625, Issued 04/2014.
25. Fedorov, A. G., "*Evaporation-Enhanced Thermal Management Devices, Systems, and Methods of Heat Management* ", U.S. Patent No. 8,710,625, Issued 06/2014.
26. Fedorov, A. G., Green, C., Joshi, Y. K., "*Devices Including Composite Thermal Capacitors* ", U.S. Patent No. 8,878,340, Issued 11/2014.
27. Fedorov, A. G., "*Passive Heat Sink for Dynamic Thermal Management of Multiple Hot Spots*", U.S. Patent No. 8,953,314, Issued 02/2015.
28. Fedorov, A. G. and Damm, D. L., "*Hydrogen-Generating Reactors and Methods*", U.S. Patent No. 9,403,143, Issued 08/2016.
29. Fedorov, A. and Kottke, P. A., "*SMS Probe and SEM Imaging System and Methods of Use*", U.S. Patent No. 9,245,722, Issued 01/2016.
30. Fedorov, A. G., "*Thermal Ground Planes, Thermal Ground Plane Structures, and Methods of Heat Management*", U.S. Patent App. 12/331,579, Filed 12/2008.
31. Meacham, J. M., Fedorov, A. G., and Degertekin, F.L. "*Self-Pumping Structures and Methods of Use Self-Pumping Structures*", U.S. Patent App. 13/065,649, Filed 03/2011.
32. Fedorov, A. and Green, C. E., "*Thermal Capacitors for Minimizing Complications and Side Effects of Thermal Medicine*", U.S. Patent App. 13/833,455, Filed 03/2013.
33. Meacham, J. M., Durvasula, K., Mehta, A., Fedorov, A. G., and Degertekin, F.L. "*Intracellular Delivery and Transfection Methods and Devices*", U.S. Patent App. 61/777,980, Filed 08/2014.
34. Fedorov, A. and Kottke, P. A., "*Evaporation Cooling Devices and Systems and Methods of Removing Heat from Hot Spots*", U.S. Patent App 61/772,614, Filed 09/2014.
35. Fedorov, A. G. and Anderson, D. "*Reactors for Fuel Reforming and Methods of Use Thereof*", U.S. Patent App. 61/971,066, Filed 03/2015.
36. Fedorov, A. G., "*Systems and Methods for Electron Beam Induced Processing*", U.S. Patent App. 62/167,596, Filed 05/2016.
37. Yee, S., Fedorov, A. G., Lee, S., Limia, A., "*Thermo-Electro-Chemical Converter and Methods of Use Thereof*", U.S. Patent App. 62/207,051, Filed 08/2016.

IV. SERVICE

A. PROFESSIONAL CONTRIBUTIONS

- *Invited Expert Contributor*, Stanford Patent Peer Review Project (2016).
- *General Co-Chair*, 5th International Forum on Environment and Energy Science, San Diego, California, USA (December 15-19, 2016).
- *International Scientific Committee*, International Symposium on "Interfacial Phenomena and Heat Transfer", Novosibirsk, Russia (March 2-4, 2016).
- *General Co-Chair*, 4th International Forum on Environment and Energy Science, Maui, Hawaii, USA (December 6-10, 2015).
- *International Scientific Committee*, IX International Conference on "Heat Pipes, Heat Pumps, Refrigerators, Power Sources", Minsk, Belarus (September 7–10, 2015).
- *Discussion Leader*, Gordon Research Conference on "Micro & Nanoscale Phase Change Heat Transfer", Galveston, Texas, USA (January 11-16, 2015).
- *International Advisory Board*, Bulletin of Japanese Society of Mechanical Engineering (JSME), including Mechanical Engineering Reviews, Transactions of the JSME (in Japanese), Mechanical Engineering Journal, and Mechanical Engineering Letters (2013-2015).
- *Member of International Advisory Board*, Academy for Co-Creative Education in Environment and Energy Science (ACEEES), Tokyo Institute of Technology, Japan (2013-Present).
- *General Co-Chair*, 2nd International Forum on Environment and Energy Science, Hyatt Regency Huntington Beach Resort and Spa, California, USA (December 13-17, 2013).
- *General Co-Chair*, 1st International Forum on Environment and Energy Science, Waikoloa, Hawaii, USA (December 14-18, 2012).
- *Editorial Board*, International Journal of Interfacial Phenomena and Heat Transfer (2012-Present).
- *International Advisory Board*, Tokyo Institute of Technology's Global Center of Excellence for Energy Science (2008-2012).
- *International Editorial Board*, Journal of Nanoelectronics and Optoelectronics (2007-Present).
- *Editorial Advisory Board*, International Journal of Multiscale Computational Engineering (2004-Present).
- *General Co-Chair*, 4th International Forum on Multidisciplinary Education and Research for Energy Science, Honolulu, Hawaii, USA (December 17-21, 2011).
- *Co-Chair*, National Science Foundation Workshop on "Nanotechnologies for Solar and Thermal Energy Conversion and Storage", Jacksonville, Florida (August 10-11, 2008).
- *General Chair*, 3rd Energy Nanotechnology International Conference, ASME Nanotechnology Institute, Jacksonville, Florida (August 2008).
- *Technical Program Chair*, 2nd Energy Nanotechnology International Conference, ASME Nanotechnology Institute, Santa Clara, California (September 2007).
- *Co-Chair*, 4th IASME/WSEAS International Conference on Fluid Mechanics (Fluids-2006), Miami, Florida, USA (January 2006), 3rd IASME/WSEAS International Conference on Fluid Mechanics and Aerodynamics, Corfu Island, Greece (August 2005).
- *International Scientific Committee*, 2nd ThETA Conference "Thermal Issues in Emerging Technologies", Cairo, Egypt (December 2008), 16th School-Seminar "Problems of Heat and Mass Transfer & Gas

Dynamics in Power Plants", Saint-Petersburg, Russia (May 2007), 2005 International Conference on Heat and Mass Transfer, Udine, Italy (January 2005); 2nd International Conference on Fluid Mechanics, Corfu Island, Greece (August 2004).

- *Guest Editor*, Special Issue on Multiscale Transport Phenomena, International Journal of Multiscale Computational Engineering (2004).
- *Chair/Co-Chair*, Technical Sessions "Heat Transfer in Fuel Cells" at 2005 & 2007 ASME Summer Heat Transfer Conferences; "Radiative Heat Transfer in Participating Media" at 2004 ASME Heat Transfer/Fluids Engineering Summer Conference; "Heat Transfer in Fuel Cells", at 2003 ASME International Mechanical Engineering Congress and Exposition IMECE-03; "Open Forum on Radiative Heat Transfer" at 2002 AIAA/ASME Joint Thermophysics and Heat Transfer Conference; "Multiscale Transport Phenomena in Energy Systems" at 2001 ASME International Mechanical Engineering Congress and Exposition IMECE-01; "Open Forum on Radiative Heat Transfer" at 2000 ASME National Heat Transfer Conference.
- *Member*, ASME Heat Transfer Division K-6 Committee on Heat Transfer in Energy Systems (1999-Present), ASME Heat Transfer Division K-22 Committee on Heat Transfer Visualization (2002-Present).
- *Member*, American Society of Mechanical Engineers (1994-Present), American Society of Mass Spectrometry (2006-Present).
- *Reviewer of technical papers*, Nanoscale (since 2012), Biomacromolecules (since 2009), ASME Journal of Biomechanical Engineering (since 2008), Nanotechnology (since 2007), Lab-on-a-Chip (since 2007), Journal of Membrane Science (since 2007), IEEE Transactions on Components and Packaging Technologies (since 2007), IEEE/ASME Journal of Electronic Packaging (since 2005), Langmuir (since 2004), Analytical Chemistry (since 2004), Journal of Computational Mechanics (since 2004), Multiscale Computational Engineering (since 2004), Physics of Fluids (since 2003), European Physical Journal-Applied Physics (since 2003), Experiments in Fluids (since 2003), Industrial & Engineering Chemistry Research (since 2003), ASME Journal of Energy Resources Technology (since 2003), Heat Transfer Engineering (since 2003), Journal of Enhanced Heat Transfer (since 2003), IEEE/ASME Journal of MEMS (since 2002), Numerical Heat Transfer (since 2002), International Journal of Heat and Mass Transfer (since 2002), Acta Mechanica (since 2002), ASME Journal of Manufacturing Science and Engineering (since 2002), Journal of Quantitative Spectroscopy and Radiative Transfer (since 2001), Journal of Transport in Porous Media (since 2001), ENERGY-The International Journal (since 2000), Sensors & Actuators (since 2000), Applied Energy Journal (since 1998), ASME Journal of Heat Transfer (since 1997), United States Nuclear Regulatory Commission (1996), Proceedings of the Russian Academy of Sciences (1992-1994).
- *Reviewer of research proposals*, Office of Naval Research (since 2001), Army Research Office (since 2001), US Civilian Research and Development Foundation (since 2002), Kentucky Science Foundation (since 2002), US Department of Energy (since 2003), American Institute of Biological Sciences (since 2003), California Energy Commission (since 2003), National Science Foundation (since 2003), ACS Petroleum Research Fund (since 2005), National Institutes of Health (2010).
- *Fellowship Selection Committee*, Pi Tau Sigma Student Scholarship (2010-2011).
- *Academic Advisory Board*, School of Power Engineering, Bauman MSTU, Russia (1990-1994).

V. GRANTS AND CONTRACTS

A. AS PRINCIPAL AND CO-PRINCIPAL INVESTIGATOR

- Completed Projects

1. *Fuel Microprocessors for Liquid Fuels: Integration of Piezo-Electrically Driven Atomizer with the MEMS Catalytic Microreactor.* **Agency:** Air Products & Chemicals, Inc.; **Period:** January 2, 2002 – July 31, 2003.
2. *Novel Reverse-Flow Microreactor for Hydrogen Production for Fuel Cells.* **Agency:** Air Products & Chemicals, Inc.; **Period:** March 1, 2001 – February 28, 2002.
3. *Scalable, Low-Cost, Solid-State Photocatalytic Reactor for Low Temperature, Energy Efficient Disinfection of Water/Air Streams for Personal, Hospital, and Residential Use.* **Agency:** Emory/GT Biomedical Technology Center; **Period:** July 1, 2002 – June 30, 2003.
4. *Phase I: An Integrated Approach at Modeling and Mitigating SOFC (Solid Oxide Fuel Cell) Failure.* **Agency:** US Department of Energy (DOE); **Period:** October 1, 2002 – September 30, 2003.
5. *Development of the Micromachined Acoustic Atomizer for Vaccine Aerosolization.* **Agency:** Creare, Inc./Center for Disease Control and Prevention (CDC); **Period:** October 1, 2003 – August 31, 2004.
6. *Thermal Management of Next Generation Integrated Circuits.* **Agency:** MARCO/DARPA through Interconnect Focus Center; **Period:** September 1, 2002 – August 31, 2006.
7. *Micromachined Ultrasonic Atomizer for Aerosolized Vaccine/Drug Delivery.* **Agency:** CDC/GT Seed Grant Program; **Period:** September 30, 2004 – October 1, 2006.
8. *Phase II: An Integrated Approach at Modeling and Mitigating SOFC (Solid Oxide Fuel Cell) Failure.* **Agency:** US Department of Energy (DOE); **Period:** October 1, 2003 – January 30, 2006.
9. *Advanced Cryogenic Cooling and Evaluation of its Physical Limits.* **Agency:** MARCO/DARPA through Interconnect Focus Center; **Period:** January 1, 2005 – August 31, 2006.
10. *Electrohydrodynamics of AFM Imaging of Biological Membranes.* **Agency:** National Science Foundation (NSF); **Period:** January 1, 2005 – January 1, 2007.
11. *BIOCOMPLEXITY: Multifunctional Scanning Nanoprobes for In-Situ Analysis of Chemical Processes at Microbe/Mineral Interfaces.* **Agency:** National Science Foundation (NSF); **Period:** September 1, 2002 – August 30, 2007.
12. *MEMS-Enabled Processing of Liquid Fuels for Distributed Power Generation Using Fuel Cells.* **Agency:** National Aeronautics and Space Administration (NASA); **Period:** September 1, 2003 – December 31, 2007.
13. *CHAMP: Scalable Technology for Distributed Hydrogen Production and CO₂ Capture.* **Agency:** Georgia Tech (Creating Energy Option CEO Program); **Period:** April 30, 2007 – April 30, 2008.
14. *Energy Nanotechnology International Conference.* **Agency:** National Science Foundation (NSF); **Period:** March 1, 2008 – January 31, 2008.
15. *Multifunctional Scanning Probes for Imaging Cellular Signaling Processes.* **Agency:** National Institute of Health (NIH); **Period:** September 15, 2003 – September 14, 2009.
16. *Thermal Management of Next Generation Integrated Circuits.* **Agency:** MARCO/DARPA through Interconnect Focus Center; **Period:** September 1, 2006 – August 31, 2009.

17. *Scanning Mass Spectrometry (SMS) Probe for Biochemical Imaging on the Nanoscale.* **Agency:** National Science Foundation (NSF); **Period:** February 15, 2008 – January 31, 2010.
18. *Scanning Mass Spectrometry Probe for Bioanalytical Applications.* **Agency:** National Institute of Health (NIH) "Pathway to Independence" Program; **Period:** September 1, 2007 – January 31, 2010.
19. *AMUSE (Array of Micromachined UltraSonic ElectroSpray) for Bioanalytical Mass Spectrometry.* **Agency:** National Institute of Health (NIH); **Period:** September 1, 2006 – June 31, 2010.
20. *NIRT: Electron Beam CVD – A New Tool for Synthesis of Nanomaterials and Devices.* **Agency:** National Science Foundation (NSF); **Period:** September 1, 2004 – August 31, 2011.
21. *NIRT: Active Nanoparticles in Nanostructured Materials Enabling Advances in Renewable Energy and Environmental Remediation.* **Agency:** National Science Foundation (NSF); **Period:** August 15, 2006 – August 15, 2011.
22. *Acquisition of the Bruker MicroTOF Mass Spectrometer towards Development of the Scanning Mass Spectrometry (SMS) Nanoprobe for In-Situ Biochemical Imaging on Nanoscale.* **Agency:** National Science Foundation (NSF) Major Research Instrumentation (MRI) Program; **Period:** August 1, 2007 – August 1, 2010.
23. *Development and Characterization of Low-Temperature Ohmic Contact between CNT and Metal Interconnects Using Focused Electron Beam Chemical Vapor Deposition.* **Agency:** Semiconductor Research Corporation (SRC); **Period:** January 1, 2009 – January 1, 2012.
24. *GRA-Phase I & II OpenCell Technologies.* **Agency:** GT Office of Provost; **Period:** September 1, 2009 – May 31, 2011.
25. *Thermal Management of Next Generation Integrated Circuits.* **Agency:** MARCO/DARPA through Interconnect Focus Center; **Period:** September 1, 2009 – October 31, 2012.
26. *MTIF/GTRI Collaboration: Modeling and Simulation of Bio/chemical Sensors.* **Agency:** Defense Threat Reduction Agency (DTRA)/Air Force; **Period:** December 1, 2009 – November 31, 2011.
27. *Drop-on-Demand Deposition of Complex Fluids for 3-D Manufacturing.* **Agency:** National Science Foundation (NSF); **Period:** August 1, 2009 – June 1, 2013.
28. *Liquid Fuel Reformation in Direct Droplet Impingement Reactor.* **Agency:** National Science Foundation (NSF); **Period:** August 1, 2009 – August 1, 2013.
29. *GRA.VL13.B34-InvisiCool.* **Agency:** Georgia Research Alliance; **Period:** January 1, 2013 – August 31, 2013.
30. *Dynamically-Adaptive, Hybrid Micro/Nano-Structured Superhydrophobic Surfaces for Critical Thermal and Moisture Management Applications.* **Agency:** Air Force Research Lab/BIONIC Center; **Period:** September 1, 2010 – September 30, 2014.
31. *Electron Beam Induced Deposition (EBID) of Low-Temperature, Ohmic Contact to Graphene Interconnects Using Graphitic Nano-Joints: Process Development, Property Characterization, and Fundamental Understanding.* **Agency:** Semiconductor Research Corporation (SRC); **Period:** November 1, 2011 – November 1, 2014.
32. *GRA.VL13.B34-InvisiCool.* **Agency:** Georgia Research Alliance; **Period:** January 1, 2013 – December 31, 2015.

33. *Mass Spectrometry Probe (MSP) for In-Situ, Untargeted, Transient Biochemical Imaging of Submerged Biological Interfaces.* **Agency:** National Institute of Health (NSF); **Period:** September 1, 2011 – September 1, 2015.
 34. *Three-Dimensional Stackable Evaporative Cooling of Microelectronics.* **Agency:** Defense Advanced Research Project Agency (DARPA). **Period:** January 1, 2013 – July 31, 2016.
 35. *SUPERCool 3D ICs – Superior Performance Electronics using Recirculating Coolant for 3D ICs.* **Agency:** Defense Advanced Research Project Agency (DARPA). **Period:** August 1, 2013 – July 31, 2016.
 36. *Using Energetic Jets to Enable New Modes for Focused Electron Beam Induced Deposition of 3D Nanostructures.* **Agency:** Department of Energy (DOE BES); **Period:** August 15, 2013 – August 14, 2016.
- **Current Projects**
 1. *DRILL: Droplet Transmission and Ion Desolvation Interface for Mass Spectrometry (R01).* **Agency:** National Institute of Health (NIH); **Period:** September 15, 2014 – September 14, 2018.
 2. *Hydrogen Production from Natural Gas Using Sorption-Enhanced Membrane Reactors and Structured Catalysts.* **Agency:** US Civilian Research and Development Foundation (CRDF); **Period:** December 1, 2014 – April 30, 2017.
 3. *Sodium Ion Expansion Power Block for Distributed CSP.* **Agency:** US Department of Energy EERE; **Period:** September 15, 2015 – September 14, 2018.
 4. *Invisicool Gel: Passive “Invisible” Pain Reduction of Thermal/Laser-Based Medical Procedures Using Phase Change Materials.* **Agency:** Coulter Foundation; **Period:** July 1, 2015 – May 30, 2017.
 5. *Electrified Liquid Jets from Nanostructured Surfaces for Phase Change Heat Transfer Enhancement.* **Agency:** National Aeronautics & Space Administration (NASA); **Period:** August 1, 2016 – July 31, 2019.
 6. *Using Multiphase Energetic Precursor Jets to Enable New Modes of Focused Electron Beam Induced Processing.* **Agency:** Department of Energy (DOE BES); **Period:** August 15, 2016 – August 14, 2019.

B. AS INVESTIGATOR

1. *Focused Research Program in Micro/Nano Thermal Engineering.* **Agency:** Georgia Tech; **Period:** August 1, 2003 – July 31, 2004.
2. *Focused Research Program in Laser CVD.* **Agency:** Georgia Tech; **Period:** August 1, 2002 – July 31, 2003.
3. *Focused Research Program in Efficient Nano/Micro Molding.* **Agency:** Georgia Tech; **Period:** August 1, 2000 – July 31, 2003.
4. *qHUB: Cyberinfrastructure for Community-Driven Research and Learning in Heat Transfer.* **Agency:** National Science Foundation; **Period:** August 1, 2007– July 31, 2009.

VI. HONORS AND AWARDS

- Raymond Viskanta Fellowship and Lectureship, Purdue University (2017).
- Invited Visiting Professor, Tokyo Institute of Technology, Japan (Summer 2015).

- Grand Challenge Ambassador/Featured Guest, "Carbon Use Grand Challenge" Summit, Climate Change and Emission Management Corporation (CCEMC), Alberta, Canada (2014).
- Best paper award "Droplet impact dynamics in ink-jet manufacturing" at the 5th International Conference on Advanced Research in Virtual and Rapid Prototyping, Leiria, Portugal (2011).
- ASME Pi Tau Sigma Gustus L. Larson Memorial Award for Outstanding Achievements in Mechanical Engineering within Ten to Twenty Years Following Graduation (2010).
- NASA Invention & Contribution Board (ICB) Award, National Aeronautics and Space Administration, for "technical contributions to NASA, which have significant value in the conduct of aeronautical and space activities" (2010).
- SRC Inventor Recognition Award, Semiconductor Research Corporation (2009).
- ITherm'08 (IEEE Intersociety Conference on Thermal and Thermomechanical Phenomena in Electronic Systems) Outstanding Paper Award in Thermal Management (2008).
- Class of 1934 Outstanding Interdisciplinary Activity Award, Georgia Institute of Technology (2008).
- Georgia Tech's CETL "Thanks a Teacher" Certificate (2008, 2010, 2011, 2012).
- Woodruff Endowed Faculty Fellow, Georgia Institute of Technology (2007-2012).
- ASME Bergles-Rohsenow Young Investigator Award for Sustained Contribution to Heat, Mass, and Radiation Transfer (2007).
- MARCO Inventor Recognition Award, Microelectronics Advanced Research Corporation (2006, 2007).
- Invited Participant, National Academy of Engineering (NAE) Frontiers of Engineering Symposium (2006).
- SME Branimir F. von Turkovich Outstanding Young Manufacturing Engineer Award (2006).
- World Technology Network (WTN) Elected Associate, as recognition of "the most innovative people and organizations in the science and technology world", and Nominee for the WTN World Technology Award in Health and Medicine (2005).
- Sigma Xi (Georgia Tech Chapter) Young Faculty Award (2004).
- Emerging Scientist Travel Support Award to attend and present a talk at the 3rd International Symposium on Radiative Transfer, National Science Foundation (2001).
- Meritor Excellence Teaching Award Nominee, Georgia Tech Women in Engineering Program (2000).
- Certificate of Appreciation, Purdue Mechanical Engineering Heat Transfer Faculty (1998).
- President of the Russian Federation Outstanding Young Investigator Award (1994).
- Best paper award, 2nd Int. Conference "Current Problems of Fundamental Sciences", Moscow (1994).
- Bauman MSTU Scientific Advisory Board Research Fellowship (1993).
- Ministry of Energy of the Russian Federation Fellowship (1992).

- V. I. Lenin Honorary Fellowship for Outstanding Academic Achievements (1989-1992).