

**BOARD OF TRUSTEES  
UNIVERSITY OF THE DISTRICT OF COLUMBIA  
UDC RESOLUTION NO. 2017 - 20**

**SUBJECT: TENURE APPROVAL FOR DR. KATE KLEIN, SCHOOL OF ENGINEERING & APPLIED SCIENCES**

**WHEREAS**, pursuant to 8B DCMR §1467, the School of Engineering & Applied Sciences (SEAS) Promotion Committee has determined that Dr. Kate Klein is qualified for the position of Associate Professor of Mechanical Engineering; and

**WHEREAS**, pursuant to 8B DCMR §1462, Dr. Klein has served as Assistant Professor at UDC since 2012 and, as further evidenced on Appendix A attached hereto, is recognized by her students, faculty members, administrators, and other experts in her field for her excellent teaching skills, record of strong research, and contributions to undergraduate research involving students; has secured grants (currently totaling over \$1M) from agencies such as the National Institute of Standards and Technology (NIST), National Science Foundation (NSF), and the U.S. Air Force primarily for research in the area of synthesis and characterization of nanostructured materials, high resolution imaging studies using helium neon microscopy; and has authored more than thirty peer-reviewed journal articles, which articles have been cited more than 800 times in the last four years; and

**WHEREAS**, pursuant to 8B DCMR §§ 1468 and 1470, the Dean of SEAS and the Chief Academic Officer and President have affirmed the recommendation of tenure for Dr. Klein and the President has forwarded the recommendation for tenure to the Board of Trustees (the "Board") of the University; and

**WHEREAS**, pursuant to 8B DCMR § 1470, the Board desires to approve the award of tenure to Dr. Klein to SEAS based on the recommendation of the Dean of SEAS and the Chief Academic Officer and President.

**NOW, THEREFORE, BE IT RESOLVED** that the Board approves the award of tenure to Dr. Klein.

Submitted by the Academic and Student Affairs Committee

August 24, 2017

Approved by the Board of Trustees:

September 19, 2017



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Christopher Bell  
Chairperson of the Board

## APPENDIX A

# Kate L. Klein, Ph.D.

University of the District of Columbia  
Washington, DC 20008

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*Assistant Professor in Mechanical Engineering with research expertise in nanomaterials synthesis & characterization, in-situ measurement, and mechanical properties of materials. Demonstrates a strong, highly collaborative research record with h-index of 17.*

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## EDUCATION

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- National Research Council Postdoctoral Fellowship  
National Institute of Standards and Technology, Gaithersburg, Maryland  
Project Title: *In vitro transmission electron microscopy of individual functionalized nanoparticles* August 2009-2011
- Doctor of Philosophy in Materials Science and Engineering, Nanomaterials Concentration  
University of Tennessee, Knoxville, Tennessee (Cumulative GPA: 3.9/4.0) May 2009  
Dissertation Title: *Synthesis and Characterization of Nanostructured Materials* (available online at UTK Library)
- Bachelor of Science in Engineering, Mechanical Concentration, ABET accredited program  
Trinity College, Hartford, Connecticut (Cumulative GPA: 3.7/4.0, Major GPA: 3.8/4.0) May 2003
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## RELEVANT EXPERIENCE

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- Department of Mechanical Engineering, University of the District of Columbia, Washington, DC  
Assistant Professor and Program Chair: August 2012-Present
- Taught Intro to Engineering, Materials Science, Thermodynamics, and Mechanics of Solids (lecture & lab); mentored Senior Design projects; developed new course curricula
  - Maintained active research program involving undergraduates in research on campus and at the National Institute of Standards and Technology (NIST)
  - Continuation of Guest Researcher appointment at NIST for collaborative nanomachining and *in situ* microscopy research
  - Faculty Advisor for the Society of Woman Engineers student club
  - Managed two labs (Characterization and Mechanical Testing); designed lab and purchased equipment for each lab
  - Published 7 articles in peer-reviewed journals, presented research at international conferences
  - Principal Investigator \$200k NSF grant; participated in writing 5 other *funded* proposals (totaling more than \$300k)
  - Appointed Program Chair of the Mechanical Engineering Department in August 2015
- Carl Zeiss Microscopy, LLC, Peabody, Massachusetts  
Applications Development Field Scientist (Guest Researcher at NIST in Gaithersburg, MD): August 2011-June 2013
- Developed applications for the ORION helium ion microscope based on the needs of NIST and other collaborators
  - Provided on-site instrument support for troubleshooting hardware and software issues associated with the ORION
  - Investigated material etching/deposition processes with the helium ion beam and gas injection systems
  - 1<sup>st</sup> place winner of the Microscopy Society of America and EIPBN Micrograph Contests
  - Published 2 articles, presented research at 2 international conferences
- Surface and Microanalysis Science Division, National Institute of Standards and Technology, Gaithersburg, Maryland  
Materials Research Engineer: August 2009-August 2011
- Established new methods for high-resolution *in situ* characterization of individual nanoparticles in liquid using transmission electron microscopy (TEM) and flow-cell devices; collaborations with industry and the NIH
  - Examined nanoparticle properties and behavior in wet environments; *first to image hydrated, soft materials at nanoscale*
  - Responsible for design of experiments, data synthesis and analysis, collaboration as part of a research team, maintaining laboratory equipment, ordering lab supplies/chemicals, and developing standard operating procedures and safety protocols
  - Published 4 articles, presented research at 5 international conferences, and participated in writing 2 funding proposals
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Center for Nanophase Materials Sciences, Oak Ridge National Laboratory, Oak Ridge, Tennessee

**Research Associate** (employed by the University of Tennessee):

September 2003-July 2009

- Conducted fundamental research, as part of an interdisciplinary team, toward the controlled synthesis and directed assembly of novel nanoscale materials (primarily carbon nanofibers and alloy catalyst nanoparticles)
- Performed advanced characterization of nanoscale systems, including *in situ* TEM measurement under heating and bias
- Synthesized and characterized nanoscale components for collaborative user research projects, which included the fabrication of cellular probes, gene delivery arrays, and nanofluidic membranes for potential application in medical devices
- Evaluated user proposals as part of the review panel for the Center for Nanophase Materials Sciences
- Authored 19 publications (including three review articles), presented research at 8 international conferences, and participated in writing 2 funding proposals

Materials Engineering & Microscopy Facility, Trinity College, Hartford, Connecticut

**Research Assistant:**

January 2000-May 2003

- Characterized the microstructure of silicon nanowires and ferroelectric thin films using TEM
- Fabricated thin film aerogels and characterized them using atomic force microscopy (AFM) and TEM
- Constructed a high temperature vacuum annealing chamber, then studied the effects of annealing on carbon nanofibers using TEM to determine if graphitization could be improved

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### TECHNICAL SKILLS

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**Mechanical Property Testing:** hardness, tensile, bending, and torsion testing

**Microscopy and Microanalysis Techniques:** HIM, XRD, AFM, SEM, TEM, STEM, XEDS, EELS, EFTEM and electron diffraction; image processing with ImageJ, Digital Micrograph, Adobe Photoshop; CrystalMaker modeling program

**Microfabrication:** Physical vapor deposition of thin film metals, reactive ion etching and chemical vapor deposition of thin films, plasma enhanced chemical vapor deposition of carbon nanofibers, resist patterning, and wet chemical processing

**Molecular Biology:** Certificate of completion of the New England Biolabs' intensive 2-week training program in Molecular Biology at Smith College, Northampton, Massachusetts

July 2005

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### MEMBERSHIPS, AWARDS, & FELLOWSHIPS

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**Societies:** Microscopy Society of America (MSA, MAS), Materials Research Society (MRS), Society of Women Engineers (SWE)  
Electron, Ion, Photon Beam and Nanotechnology (EIPBN) Conference Committee  
Member of the Trinity College Engineering Advisory Council (TEAC)  
Member of the Proposal Review Committee for the Center for Nanophase Materials Sciences, ORNL  
PI of \$200,000 ATE grant, National Science Foundation  
UDC Faculty Recognition Award for Outstanding University Service  
Micrograph Selected for the "Life: Magnified" exhibit at Dulles Airport  
UDC Faculty Recognition Award for Outstanding Research and Student Monitoring  
Co-PI of \$200,000 Research Instrumentation Grant, Air Force Office of Research  
1<sup>st</sup> place winner of the Micrograph Contest of the Microscopy Society of America  
Best Ion Micrograph Winner at the International EIPBN Conference  
International Microscopy Congress (IMC17) Scholarship Award  
Cover image: JOURNAL OF APPLIED PHYSICS  
Cover image: CARBON  
National Science Foundation EAPSI Fellowship, Japan  
Center for Nanophase Materials Sciences Research Scholar Award  
President of the Society of Women Engineers, Trinity College Chapter  
Department of Energy ERULF Fellowship, Oak Ridge National Laboratory  
National Science Foundation NNUN REU Fellowship, Stanford University

May 2014-Present

March 2014-Present

March 2014-Present

June 2014-2016

April 2015

June 2014-January 2015

April 2014

March 2013-2014

August 2013

June 2013

September 2010

March 15, 2008

January 2006-2008

June-August 2007

Spring 2004

Fall 2001-Spring 2003

June-August 2002

June-August 2001

1. S. Tan, K. Klein, D. Shima, R. Livengood, E. Mutunga, and A. Vladár. *Mechanism and applications of helium transmission milling in thin membranes*. JOURNAL OF VACUUM SCIENCE & TECHNOLOGY B 32, 06FA01 (doi: 10.1116/1.4900728), October 2014.
2. K. Doudrick, S. Liu,† E.M. Mutunga, K.L. Klein, V. Damlé, K.K. Varanasi, and K. Rykaczewski. *Different Shades of Oxide: From Nanoscale Wetting Mechanisms to Contact Printing of Gallium-Based Liquid Metals*. LANGMUIR 30 (23): 6867–6877 (doi: 10.1021/la5012023), May 2014.
3. R. Pearce, T. McKnight, K.L. Klein, I.N. Ivanov, D.K. Hensley, H.M. Meyer III, and A.V. Melechko. *Synthesis and properties of SiN coatings as stable fluorescent markers on vertically aligned carbon nanofibers*. AIMS MATERIALS SCIENCE 1(2): 87-102 (doi:10.3934/matsci.2014.1.87), April 2014.
4. C.M. Gonzalez, R. Timilsina, G. Li, G. Duscher, P.D. Rack, W. Slingenberg, W.F. van Dorp, J.T.M. De Hosson, K.L. Klein, H.M. Wu, L.A. Stern. *Focused helium and neon ion beam induced etching for advanced extreme ultraviolet lithography mask repair*. JOURNAL OF VACUUM SCIENCE & TECHNOLOGY B 32(2): 021602, March 2014. <<JVSTB top cited article for 2014>>
5. H. Wu, L.A. Stern, D. Xia, D. Ferranti, B. Thompson, K.L. Klein, C.M. Gonzalez, P.D. Rack. *Focused helium ion beam deposited low resistivity cobalt metal lines with 10 nm resolution: implications for advanced circuit editing*. JOURNAL OF MATERIALS SCIENCE: MATERIALS IN ELECTRONICS 25(2): 587-595, February 2014.
6. M.J. Dukes, R. Thomas, J. Damiano, K.L. Klein, S. Balasubramanian, S. Kayandan, J.S. Riffle, R.M. Davis, S.M. McDonald, D.F. Kelly. *Improved Microchip Design and Application for In Situ Transmission Electron Microscopy of Macromolecules*. MICROSCOPY AND MICROANALYSIS 1-8, December 2013.
7. J.M. Gorham, R.I. MacCuspie, K.L. Klein, D.H. Fairbrother, R.D. Holbrook. *UV-induced photochemical transformations of citrate-capped silver nanoparticle suspensions*. JOURNAL OF NANOPARTICLE RESEARCH 14:1139 (doi: 10.1007/s11051-012-1139-3), September 2012.
8. K.L. Klein, I.M. Anderson, and N. de Jonge. *Transmission electron microscopy with a liquid flow cell*. JOURNAL OF MICROSCOPY 242(2): 217-123, May 2011.
9. M.F. Sarac, R.M. Wilson, A.C. Johnston-Peck, J. Wang, Ryan Pearce, K.L. Klein, A.V. Melechko, and J.B. Tracy. *Effects of ligand monolayers on catalytic nickel nanoparticles for synthesizing vertically aligned carbon nanofibers*. APPLIED MATERIALS AND INTERFACES (doi: 10.1021/am101290v), March 2011.
10. E.C. Landis, K.L. Klein, A. Liao, E. Pop, D.K. Hensley, A.V. Melechko, and R.J. Hamers. *Covalent functionalization and electron-transfer properties of vertically aligned carbon nanofibers: The importance of edge-plane sites*. CHEMISTRY OF MATERIALS 22 (7): 2357-2366, April 2010.
11. A.V. Melechko, R. Desikan, T.E. McKnight, K.L. Klein, and P.D. Rack. *Synthesis of vertically aligned carbon nanofibers for interfacing with live systems*. (Review) JOURNAL OF APPLIED PHYSICS: D 42, Art. No. 193001, September 2009.
12. I.A. Merkulov, K.L. Klein, and M.L. Simpson. *A synergetic description of carbon nanofiber growth*. JOURNAL OF APPLIED PHYSICS 105, Art. No. 064303, March 2009.
13. K.D. Sorge, K.L. Klein, A.V. Melechko, C.L. Finkel, O. Malkina, Th. Leventouri, J.D. Fowlkes, P.D. Rack, and M.L. Simpson. *Magnetic properties of Fe-Co catalysts used for carbon nanofiber synthesis*. JOURNAL OF APPLIED PHYSICS 104, Art. No. 033909, August 2008.
14. K.L. Klein, S.J. Randolph, J.D. Fowlkes, L.F. Allard, H.M. Meyer III, M.L. Simpson, and P.D. Rack. *Single-crystal nanowires grown via electron-beam-induced deposition*. NANOTECHNOLOGY 19, Art. No. 345705, July 2008.

15. K.L. Klein, A.V. Melechko, T.E. McKnight, S.T. Retterer, P.D. Rack, J.D. Fowlkes, D.C. Joy, and M.L. Simpson. *Surface characterization and functionalization of carbon nanofibers*. (Review and Cover Article) JOURNAL OF APPLIED PHYSICS 103 (6): Art. No. 061301, March 2008.
16. S.J. Randolph, J.D. Fowlkes, A.V. Melechko, K.L. Klein, H.M. Meyer III, M.L. Simpson, and P.D. Rack. *Controlling thin film structure for the dewetting of catalyst nanoparticle arrays for subsequent carbon nanofiber growth*. NANOTECHNOLOGY 18, Art. No. 465304, November 2007.
17. A.V. Melechko, K.L. Klein, J.D. Fowlkes, D.K. Hensley, I.A. Merkulov, T.E. McKnight, P.D. Rack, J.A. Horton, and M.L. Simpson. *Control of carbon nanostructure: from nanofiber toward nanotube and back*. JOURNAL OF APPLIED PHYSICS 102, Art. No. 074314, October 2007.
18. I.A. Merkulov, V.I. Merkulov, A.V. Melechko, K.L. Klein, D.H. Lowndes, and M.L. Simpson. *Model of carbon nanofiber internal structure formation and instability of catalytic growth interface*. PHYSICAL REVIEW: B 76, Art. No. 014109, July 2007.
19. Th. Leventouri, A.V. Melechko, K.D. Sorge, K.L. Klein, J.D. Fowlkes, P.D. Rack, I.M. Anderson, J.R. Thompson, T.E. McKnight, and M.L. Simpson. *Magnetic alloys in nanoscale biomaterials*. METALLURGICAL AND MATERIALS TRANSACTIONS A 37 (12): 3423-3427, December 2006.
20. T.E. McKnight, C. Peeraphatdit, S.W. Jones, J.D. Fowlkes, B.L. Fletcher, K.L. Klein, A.V. Melechko, M.J. Doktycz, and M.L. Simpson. *Site-specific biochemical functionalization along the height of vertically aligned carbon nanofiber arrays*. CHEMISTRY OF MATERIALS 18 (14): 3203-3211, July 2006.
21. J.D. Fowlkes, A.V. Melechko, K.L. Klein, P.D. Rack, D.A. Smith, D.K. Hensley, M.J. Doktycz, and M.L. Simpson. *Control of catalyst particle crystallographic orientation in vertically aligned carbon nanofiber synthesis*. CARBON 44 (8): 1503-1510, July 2006.
22. K.L. Klein, A.V. Melechko, J.D. Fowlkes, P.D. Rack, D.K. Hensley, H.M. Meyer III, L.F. Allard, T.E. McKnight, and M.L. Simpson. *Formation of ultrasharp vertically aligned Cu-Si nanorods by a dc plasma process*. JOURNAL OF PHYSICAL CHEMISTRY B 110 (10): 4766-4771, March 2006.
23. J.D. Fowlkes, B.L. Fletcher, E.D. Hullander, K.L. Klein, D.K. Hensley, A.V. Melechko, M.L. Simpson, and M.J. Doktycz. *Tailored transport through vertically aligned carbon nanofiber membranes: controlled synthesis, modeling, and passive diffusion experiments*. NANOTECHNOLOGY 16 (12): 3101-3109, December 2005.
24. K.L. Klein, A.V. Melechko, P.D. Rack, J.D. Fowlkes, H.M. Meyer, and M.L. Simpson. *Cu-Ni composition gradient for the catalytic synthesis of vertically aligned carbon nanofibers* (Cover Article) CARBON 43 (9): 1857-1863, August 2005.
25. A.V. Melechko, V.I. Merkulov, T.E. McKnight, M.A. Gullom, K.L. Klein, D.H. Lowndes, and M.L. Simpson. *Vertically aligned carbon nanofibers and related structures: controlled synthesis and directed assembly* (Review) JOURNAL OF APPLIED PHYSICS 97 (4): Art. No. 041301, February 2005.
26. B.L. Fletcher, E.D. Hullander, A.V. Melechko, T.E. McKnight, K.L. Klein, D.K. Hensley, J.L. Morrell, M.L. Simpson, and M.J. Doktycz. *Microarrays of biomimetic cells formed by the controlled synthesis of carbon nanofiber membranes*. NANO LETTERS 4 (10): 1809-1814, October 2004.
27. L. Zhang, D.W. Austin, V.I. Merkulov, A.V. Melechko, K.L. Klein, M.A. Gullom, D.H. Lowndes, and M.L. Simpson. *Four-probe charge transport measurements on individual vertically aligned carbon nanofibers*. APPLIED PHYSICS LETTERS 84 (20): 3972-3974, May 2004.

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JOURNAL PUBLICATIONS (continued)

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28. M.J. Doktycz, L. Zhang, A.V. Melechko, K. Klein, T.E. McKnight, P.F. Britt, M. A. Guillom, V.I. Merkulov, D.H. Lowndes, and M.L. Simpson. *Nanofiber structures as mimics for cellular membranes*. NANOTECH 2003, Proceedings of the Nanotechnology Conference and Trade Show, Vol. 3: 420-423, 2003.
29. D.L. Pechkis, C. Caragianis-Broadbridge, A.H. Lehman, K.L. Klein, J.P. Han, and T.P. Ma. *Thin film thickness and grain structure determination of ferroelectric SrBi2Ta2O9 with cross-sectional atomic force microscopy*. MICROSCOPY AND MICROANALYSIS 8 (Suppl. 2, 774CD), 2002.
30. C. Caragianis-Broadbridge, A.H. Lehman, J. R. Miecznikowski, and K.L. Klein. *Properties of thin film nanoporous silica as a function of processing and annealing methods*. MICROSCOPY AND MICROANALYSIS, Proceedings of the Microscopy Society of America, Vol. 6, 2000.

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CONFERENCE PAPERS & INVITED PRESENTATIONS

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1. E.M. Mutunga, S. Tan, A.E. Vladár, and K.L. Klein. "Progression of Focused Helium Ion Beam Milling in Gold Substrates," Microscopy & Microanalysis Conference, Portland, Oregon, August 2015 (not presented).
2. Kate L. Klein. Invited Presentation "Liquid Cell TEM: Past, Present and Future," Hitachi Headquarters In-Situ TEM Workshop, Germantown Maryland, August 2014.
3. E.M. Mutunga, S. Lockerman, S. Tan, R. Livengood, A.E. Vladár, and K.L. Klein. "Focused Helium Ion Beam Nanomachining of Thin Membranes vs. Bulk Substrates," Microscopy & Microanalysis Conference, Hartford, Connecticut, August 2014 (not presented).
4. Madelaine I. Dukes, Albert D. Dukes, III, Kate L. Klein, Rebecca Thomas, Deborah F. Kelly, and John Damiano. "Applications and Design of Reinforced Silicon Nitride Windows for In Situ Liquid Transmission Electron Microscopy," Microscopy & Microanalysis Conference, Hartford, Connecticut, August 2014.
5. C.M. Brown, K.L. Klein, D.V. Krogstad, G.A. Myers, A.A. Herzing. "Transmission Electron Microscopy of Lipid Vesicles in Liquid Cells," Microscopy & Microanalysis Conference, Hartford, Connecticut, August 2014.
6. K. Doudrick, S. Liu, E.M. Mutunga, K.L. Klein, K.K. Varanasi, and K. Rykaczewski. "In situ FIB-SEM Experimentation: from Nanoscale Wetting to Nanofabrication of Gallium-based Liquid Metals," Microscopy & Microanalysis Conference, Hartford, Connecticut, August 2014.
7. Shida Tan, Kate Klein, Darryl Shima, Rick Livengood, Eva Mutunga, and Andriás Vladár. "Mechanism and Applications of Helium Transmission Milling in Thin Membranes," EIPBN Conference, Washington D.C., May 2014 (oral presentation).
8. E.M. Mutunga, S. Lockerman, A.E. Vladár, and K.L. Klein. "Understanding Focused Helium Ion Beam Nanomachining of Membranes and Bulk Substrates," EIPBN Conference, Washington D.C., May 2014 (poster presentation).
9. K. Rykaczewski, K.L. Klein, E.M. Mutunga, and K.K. Varanasi "Methodology for Imaging of Nano-to-Microscale Wetting and Dewetting Dynamics of Liquid Metals," Materials Research Society Fall Conference, Boston, Massachusetts, November 2013 (poster presentation).
10. E.M. Mutunga, S. Lockerman, A.E. Vladár, L.A. Stern and K.L. Klein. "Helium Ion Nanomachining in Membranes and Bulk Substrates," Microscopy & Microanalysis Conference (vol. 19, S2), Indianapolis, Indiana, August 2013 (poster presentation, *winner of micrograph contest*).

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CONFERENCE PAPERS & INVITED PRESENTATIONS (continued)

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11. M.I. Dukes, K.L. Klein, R. Thomas, and J. Damiano. "Development of Reinforced Silicon Nitride Membranes for *in situ* Liquid Electron Microscopy," Microscopy & Microanalysis Conference, Indianapolis, Indiana, August 2013 (oral presentation).
12. D.N. Leonard, D.A. Cullen, K.L. Klein. "Nanoscale phase patterning in a Sr-Doped Lanthanum Cobaltite Thin Film," Microscopy & Microanalysis Conference, Indianapolis, Indiana, August 2013 (oral presentation).
13. R.H. Livengood, S. Tan, P. Hack, D.C. Ferranti, K.L. Klein, and A.E. Vladar. "Chemical Assisted Etching with Ne<sup>+</sup> & He<sup>+</sup> Ion Microscope: -Preliminary Study of Nanomachining Properties with O<sub>2</sub> and XeF<sub>2</sub>," EIPBN Conference, Nashville, Tennessee, May 2013 (oral presentation).
14. H. Wu, L.A. Stern, D.C. Ferranti, K.L. Klein, D. Xia, B. Thompson, C.M. Gonzalez, P.D. Rack. "Metal Depositions Induced by He and Ne ion beams," EIPBN Conference, Nashville, Tennessee, May 2013 (oral presentation).
15. K.L. Klein, E.M. Mutunga, A.E. Vladar, and L.A. Stern. "Understanding Nanomachining in Gold Substrates," EIPBN Conference, Nashville, Tennessee, May 2013 (oral presentation, *winner of micrograph contest*).
16. H. Wu, L.A. Stern, K.L. Klein, D. Xia, D. Ferranti, P.D. Rack, C.M. Gonzalez. "Fabrication of 10 nm Metal Lines with Low Resistivity by Helium Ion Beam Induced Deposition." 6<sup>th</sup> Annual FIB SEM Workshop, Cambridge, Massachusetts, March 2013.
17. K.L. Klein and I.M. Anderson. "Current Challenges of TEM Imaging with a Liquid Flow Cell" Microscopy & Microanalysis Conference, Phoenix, Arizona, August 2012 (invited poster presentation).
18. K.L. Klein, J. Melngailis, X. Cai, C. Huynh, A.E. Vladar, and L.A. Stern. "Understanding Surface Modification of Silicon-based Materials using Gas Field Ion Source FIB for Nano-Machining Applications." Microscopy & Microanalysis Conference, Phoenix, Arizona, August 2012 (invited poster presentation).
19. R.H. Livengood, S. Tan, Y. Greenzweig, R. Hallstein, C. Scheffler, D. Shima, K.L. Klein, A.E. Vladar. "A Study of Helium Ion Beam Substrate Interaction Volume on Nanomachining Profiles in Bulk Substrates and Thin Film Membranes." Microscopy & Microanalysis Conference, Phoenix, Arizona, August 2012 (invited oral presentation).
20. Kate L. Klein and Ian M. Anderson. "In Situ TEM of Functional Nanoparticles in Liquids." Materials Science & Technology Conference, Columbus, Ohio, October 2011 (invited oral presentation).
21. K.L. Klein, M.G. Weir, R.M. Crooks, and I.M. Anderson. "Direct Sub-Nanometer Resolution Imaging of Water-Borne Dendrimer-Encapsulated Nanoparticles by TEM." 7<sup>th</sup> International Dendrimer Symposium, Gaithersburg, Maryland, July 2011 (oral presentation, SESSION CHAIR for Session B: on Dendrimer Synthesis and Characterization).
22. K.L. Klein, N. de Jonge, and I.M. Anderson. "In Vitro Transmission Electron Microscopy of Functional Nanoparticles." Materials Research Society Spring Meeting, San Francisco, California, April 2011 (oral presentation).
23. K.L. Klein, N. de Jonge, and I.M. Anderson. "Flow Cell In Vitro TEM Imaging and Energy-Loss Characteristics." International Microscopy Congress (IMC-17), Rio de Janeiro, Brazil, September 2010 (poster presentation).
24. K.L. Klein, N. de Jonge, and I.M. Anderson. "Imaging and energy-loss characteristics for *in vitro* TEM analysis of nanoparticles." Microscopy & Microanalysis Conference, Portland, Oregon, August 2010 (poster presentation).
25. K.L. Klein. "Synthesis and Characterization of Nanostructured Materials." Dissertation Defense, University of Tennessee, Knoxville, Tennessee, April 2009 (oral presentation).



CONFERENCE PAPERS & INVITED PRESENTATIONS (continued)

26. K.L. Klein. "Toward Deterministic Synthesis of Nanostructured Materials." Division Seminar, National Institute for Standards and Technology, Gaithersburg, Maryland, December 2008 (oral presentation).
27. K.L. Klein, A.V. Melechko, P.M.F.J. Costa, D. Golberg, P.D. Rack, and M.L. Simpson. "FeNi Alloy Nanoparticles Encapsulated within Carbon Nanofibers." Nanomaterials Conference, Playa del Carmen, Mexico, December 2008 (oral presentation).
28. A.V. Melechko, K.L. Klein, I.A. Merkulov, R.C. Pearce, D.K. Hensley, and M.L. Simpson. "Controlling the direction of carbon nanofiber growth in a PECVD process." Materials Research Society Fall Meeting, Boston, Massachusetts, November 2007 (poster presentation).
29. K.L. Klein, A.V. Melechko, J.D. Fowlkes, K.D. Sorge, T. Leventouri, R. Rucker, P.D. Rack and M.L. Simpson. "Evolution of Fe-Co Magnetic Alloys: from Thin Films to Catalyst Nanoparticles for Carbon Nanofiber Synthesis." Materials Research Society Fall Meeting, Boston, Massachusetts, November 2006 (oral presentation).
30. S.J. Randolph, L.R. Baylor, W.L. Gardner, K.L. Klein, M.A. Guillom, S. Islam, R. Rucker, T. Grundman, R. Vijayaraghavan, D.C. Joy, P.D. Rack, D.K. Hensley, R.J. Kasica, D.K. Thomas, and T. Bigelow. "Design improvements and performance enhancements of the Digital Electrostatic electron-beam Array Lithography (DEAL) Prototype." Electron, Ion and Photon Beam Technology and Nanofabrication Conference, Baltimore, Maryland, June 2006 (oral presentation).
31. K.L. Klein, A.V. Melechko, J.D. Fowlkes, I.M. Anderson, K.D. Sorge, T. Leventouri, J.R. Thompson, R. Rucker, P.D. Rack, T.E. McKnight, and M.L. Simpson. "Fe-Co magnetic alloy catalysts for the synthesis of vertically aligned carbon nanofibers." Materials Research Society Spring Meeting, San Francisco, California, April 2006 (poster).
32. K.D. Sorge, T.H. Leventouri, C. Finkel, O. Malkina, P.D. Rack, A.V. Melechko, J.D. Fowlkes, K.L. Klein, and M.L. Simpson. "Magnetic properties of Fe-alloy catalyst nanoparticles for carbon nanofiber synthesis." American Physical Society Meeting, Dallas, Texas, April 2006 (oral presentation).
33. K.L. Klein, S.J. Randolph, H.M. Meyer, P.D. Rack, M.L. Simpson, L.R. Baylor, and W. L. Gardner. "Compositional and structural characterization of tungsten nanostructures produced by electron beam-induced deposition." American Vacuum Society Meeting, Boston, Massachusetts, November 2005 (poster presentation).
34. K.L. Klein, A.V. Melechko, P.D. Rack, D.K. Hensley, J.D. Fowlkes, H.M. Meyer III, L.F. Allard, D.H. Lowndes, and M.L. Simpson. "Synthesis of ultrasharp vertically aligned copper-silicon nanocones by dc plasma." Materials Research Society Fall Meeting, Boston, Massachusetts, December 2004 (oral presentation).
35. K.L. Klein, A.V. Melechko, P.D. Rack, D.K. Hensley, J.D. Fowlkes, H.M. Meyer III, L.F. Allard, D.H. Lowndes, and M.L. Simpson. "Catalytic Plasma Enhanced Chemical Vapor Deposition of Ultrasharp Vertically Aligned Silicon Nanocones and their Characterization." American Vacuum Society Meeting, Anaheim, California, November 2004 (poster presentation).
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37. K.L. Klein, A.V. Melechko, M.A. Guillom, M.J. Doktycz, L. Zhang, M.L. Simpson, T.E. McKnight, V.I. Merkulov, and D.H. Lowndes. "Fabrication and Characterization of Vertically-Aligned-Carbon-Nanofiber-Based Membrane Devices." Connecticut Microelectronics and Optoelectronics Consortium, Storrs, Connecticut, April 2003 (poster presentation). <<winner of best poster award>>
38. K.L. Klein, A.V. Melechko, M.A. Guillom, M.J. Doktycz, L. Zhang, M.L. Simpson, T.E. McKnight, V.I. Merkulov, and D.H. Lowndes. "Fabrication and Characterization of VACNF-Based Membrane Devices." DOE Nanoscale Science Research Centers Workshop, Washington, D.C., February 2003 (poster presentation).