

Kate Labelle Klein
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EDUCATION:

University of Tennessee, Knoxville, Tennessee
PhD candidate in Materials Science and Engineering
Expected Graduation: Fall 2007
Cumulative GPA: 3.9

Trinity College, Hartford, Connecticut
Bachelor of Science in Engineering, Mechanical concentration
Graduation: May 2003
Cumulative GPA: 3.7, Major GPA: 3.8

RELEVANT EXPERIENCE:

- Center for Nanophase Materials Sciences, Oak Ridge National Laboratory (ORNL)** *October 2005-Present*
Oak Ridge, Tennessee
Research Associate (University of Tennessee, MSE Dept.): Contribute to fundamental research in the controlled synthesis of nanoscale materials as part of an in-house and user research program including the operation of plasma enhanced chemical vapor deposition, integration of materials systems and advanced characterization.
- Molecular-Scale Engineering and Nanoscale Technologies Research Group, ORNL** *September 2003-Present*
Oak Ridge, Tennessee
Research Associate (University of Tennessee, MSE Dept.): Perform fundamental research as part of an interdisciplinary team toward the controlled synthesis of nanoscale materials, including Vertically Aligned Carbon Nanofiber (VACNF) growth studies and the catalytic effects of transition metal alloys.
- Engineering Department, Trinity College**, Hartford, Connecticut *September 02-May 03*
Senior Design Project: Built a high temperature vacuum annealing chamber; studied the effects of annealing on carbon nanofibers using transmission electron microscopy (TEM) and diffraction techniques.
- Engineering Science and Technology Division, ORNL**, Oak Ridge, Tennessee *June 02-August 02*
DOE ERULF Intern: Fabricated and characterized VACNF based membrane devices; presented results at DOE Nanoscale Science Research Centers Workshop in Washington, D.C. on February 27, 2003.
- Center for Integrated Systems, Stanford University**, Palo Alto, California *June 01-August 01*
NSF NNUN REU Intern: Upgraded and repaired Scanning Auger Microscope system; designed an electron beam micro-column to study the electron loss mechanisms of thin film diamond.
- Materials Engineering/Microscopy Facility, Trinity College**, Hartford, Connecticut *January 00-May 03*
Research Assistant: Characterized the microstructure of silicon nanowires and thin film SBTs using TEM; presented results at MRS and CMOC. Fabricated and characterized thin film aerogels using the AFM and TEM; presented results. Developed new TEM sample preparation techniques for aerogel and silicon specimens.
- United Technologies Trinity College Engineering Initiative**, Hartford, Connecticut *June 00-May 03*
Research Fellow: Conducted experiments on silica aerogels. Introduced high school students to robotics, engineering, materials science, chemistry and microscopy.
Tutor: Tutored undergraduate students in mathematics, physics, chemistry, and engineering.

SPECIAL SKILLS:

Microfabrication: Physical vapor deposition of thin film metals, chemical vapor thin film deposition and VACNF growth, wet chemical processing.

Microscopy Techniques: AFM, SEM, TEM, STEM, EDX, XRD; digital and photographic image processing.

Molecular Biology: Certificate of completion of New England Biolabs intensive training program in Molecular Biology at Smith College, Northampton, Massachusetts. *July 05*

HONORS AND AWARDS:

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| Center for Nanophase Materials Science Research Scholar Award | <i>Spring 04</i> |
| ASME Prize, Hartford Section | <i>Fall 02</i> |
| Bob Harron Board of Fellows Award (Trinity College Junior Scholar Athlete of the Year) | <i>Fall 01-Spring 02</i> |
| Faculty Honors, Trinity College | <i>Spring 00, Spring 02</i> |
| United Technologies TCEI Achievement Award | <i>Spring 02</i> |
| Trinity Community Service Award | <i>Spring 02</i> |
| All-NESCAC Academic Team Athletic Award | <i>Fall 00-Fall 01</i> |

ACTIVITIES:

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| Member of the Materials Research and American Vacuum Societies (International) | <i>Fall 00-Present</i> |
| President of the Society of Women Engineers, Trinity College Chapter | <i>Fall 01-Spring 03</i> |
| Varsity Athlete and Captain, Trinity College Track and Cross-Country Teams | <i>Fall 99-Spring 03</i> |
| President of the Trinity College Equestrian Team | <i>Spring 00-Fall 02</i> |

PUBLICATIONS:

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, Jul 2006.

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, Jul 2006.

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 nanocones by a DC plasma process." *JOURNAL OF PHYSICAL CHEMISTRY B* 110 (10): 4766-4771, Mar 2006.

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 nanofibre membranes: controlled synthesis, modeling, and passive diffusion experiments." *NANOTECHNOLOGY* 16 (12): 3101-3109, Dec 2005.

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." *CARBON* 43 (9): 1857-1863, Aug 2005.

A.V. Melechko, V.I. Merkulov, T.E. McKnight, M.A. Guillorn, **K.L. Klein**, D.H. Lowndes, and M.L. Simpson. "Vertically aligned carbon nanofibers and related structures: controlled synthesis and directed assembly." *JOURNAL OF APPLIED PHYSICS* 97 (4): Art. No. 041301, Feb 2005.

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, Oct 2004.

L. Zhang, D.W. Austin, V.I. Merkulov, A.V. Melechko, **K.L. Klein**, M.A. Guillorn, 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.

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.

C. Caragianis-Broadbridge, A. Hein 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.

PRESENTATIONS:

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." MRS Fall Meeting November 2006, oral presentation.

S.J. Randolph, L.R. Baylor, W.L. Gardner, **K.L. Klein**, M.A. Guillorn, 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." EIPBN Conference June 2006, oral presentation.

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." MRS Spring Meeting April 2006, poster presentation.

K.D. Sorge, TH. 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." APS Meeting March 2006, oral presentation.

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." AVS Meeting November 2005 poster presentation.

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." MRS Fall Meeting December 2004, oral presentation.

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." AVS Meeting November 2004, oral presentation.

K.L. Klein, A. V. Melechko, P. D. Rack, J.D. Fowlkes, H. M. Meyer, and M. L. Simpson. "Combinatorial Cu-Ni Catalyst for VACNF Growth: a comparative study of Composition, Growth Rate, Structure, Morphology." EIPBN Conference June 2004, oral presentation.

K.L. Klein, A.V. Melechko, M.A. Guillorn, M.J. Doktycz, L. Zhang, M.L. Simpson, T.E. McKnight, V.I. Merkulov, D.H. Lowndes. "Fabrication and Characterization of Vertically-Aligned-Carbon-Nanofiber-Based Membrane Devices." Connecticut Microelectronics and Optoelectronics Consortium April 2003, poster presentation. <<best poster award>>

K.L. Klein, A.V. Melechko, M.A. Guillorn, 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." DOE Nanoscale Science Research Centers Workshop in Washington, D.C., February 2003, poster presentation.

M.J. Doktycz, L. Zhang, A.V. Melechko, **K.L. Klein**, T.E. McKnight, P.F. Britt, M.A. Guillorn, V.I. Merkulov, D.H. Lowndes, and M.L. Simpson. "Nanofiber Structures as Mimics for Cellular Membranes." Nanotech Conference February 2003, poster presentation.

C. Caragianis-Broadbridge, D.L. Pechkis, J.P. Han, A.H. Lehman, **K.L. Klein**, C.J. Xie, W. Tong, K.H. Kim, and T.P. Ma. "Impact of Annealing Temperature on the Microstructural and Physical Properties of Ferroelectric-gate Memory Capacitors." Connecticut Microelectronics and Optoelectronics Consortium March 2002, poster presentation.

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 $\text{SrBi}_2\text{Ta}_2\text{O}_9$ with Cross-sectional Atomic Force Microscopy." Connecticut Microelectronics and Optoelectronics Consortium March 2002, poster presentation. <<best poster award>>

C. Wynschenk, S. Sinha, C. Caragianis-Broadbridge, **K.L. Klein**, and A.H. Lehman. "Studies on the Growth Conditions for Silicon Nanowires." Connecticut Microelectronics and Optoelectronics Consortium March 2002, poster presentation.

D.L. Pechkis, C. Caragianis-Broadbridge, J.P. Han, C.M. Xie, W. Tong, K.H. Kim, W. Zhu, Z. Luo, T.P. Ma, **K.L. Klein**, and A.H. Lehman. "Impact of Processing Conditions on the Microstructural and Physical Characteristics of Ferroelectric-gate Memory Capacitors." MRS Fall Meeting November 2001, poster presentation. <<finalist for best poster>>