

# Mark T. Swihart

## Curriculum Vitae

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## EDUCATION AND EMPLOYMENT

### University at Buffalo, State University of New York, Buffalo, NY

UB Distinguished Professor, September 2014-present

Professor, Chemical and Biological Engineering, August 2008-August 2014

Associate Professor, Chemical and Biological Engineering, August 2004-August 2008

Assistant Professor, Chemical and Biological Engineering, August 1998-August 2004

*Research Topics:* Synthesis and applications of nanoparticulate materials; Nanoparticle nucleation and growth; Laser pyrolysis for kinetic studies and nanoparticle synthesis; Experimental and theoretical studies of elementary reactions important for vapor phase materials synthesis; Detailed chemical kinetics, fluid dynamics, and aerosol dynamics in high temperature vapor phase materials processing; Applied computational quantum chemistry.

### University of Minnesota, Minneapolis, MN

Post-Doctoral Research Associate, Mechanical Engineering, August 1997-August 1998

*Research Topics:* Experimental and modeling studies of particle nucleation, growth and transport in silicon CVD; Modeling of r.f. plasma CVD of oriented diamond films.

*Advisors:* Steven L. Girshick, Peter H. McMurry, Stephen A. Campbell

### University of Minnesota, Minneapolis, MN

Ph.D., Chemical Engineering, July, 1997

*Fields of Study:* Reaction Engineering, Chemical Kinetics, Mathematical Modeling, Reactive Flows, Chemical Vapor Deposition Processing.

*Advisor:* Robert W. Carr

*Dissertation Title:* Gas Phase Chemical Kinetics and the Detailed Modeling of Chemical Vapor Deposition Processes

### Rice University, Houston, TX

B.S., Chemical Engineering, *Summa cum Laude*, May, 1992

## HONORS AND AWARDS

**The Jacob F. Schoellkopf Medal** of the Western New York section of the American Chemical Society, 2013.

**Department of Chemical and Biological Engineering Outstanding Professor Award**, 2004, 2008, 2011, and 2012, 2014, determined by nomination and vote of undergraduates in the department.

**Sustained Achievement Award** for research excellence, The University at Buffalo (SUNY), 2010.

**Kenneth T. Whitby Award** from the American Association for Aerosol Research, 2007. This award is presented to one individual annually and “recognizes outstanding technical contributions to aerosol science and technology by a young scientist”.

**Summer Research Scholar Faculty Mentor Award** from the University at Buffalo Collegiate Science and Technology Entry Program and Louis Stokes Alliance for Minority Participation Program, 2007, 2012.

**Outstanding McNair Faculty Mentor** from the University at Buffalo Ronald E. McNair Post-Baccalaureate Achievement Program, 2006.

**Licensed Innovation Award from the Research Foundation of SUNY**, 2005.

**J.B. Wagner Young Investigator Award of the High Temperature Materials Division of the Electrochemical Society**, 2003. This is an international award presented to only one person every two years.

**Promising Inventor Award from the Research Foundation of SUNY**, 2003.

**Doctoral Dissertation Fellowship**, University of Minnesota, 1995-96

**National Science Foundation Fellowship**, 1992-95

## PUBLICATIONS

### I. Publications in Refereed Journals:

\* *indicates corresponding author(s)*

- 1) Palafox-Hernandez, J.P., Z. Tang, Z.E. Hughes, Y. Li, M.T. Swihart, P.N. Prasad, T.R. Walsh\*, and M.R. Knecht\*, “Comparative Study of Materials-Binding Peptide Interactions with Gold and Silver Surfaces and Nanostructures: A Thermodynamic Basis for Biological Selectivity of Inorganic Materials”, *Chemistry of Materials*, in press, published online (2014). DOI: 10.1021/cm501529u
- 2) Song, E.Q.\*, W. Han, H. Xu, D. Cheng, Y. Song, and M.T. Swihart, “Magnetically-encoded luminescent composite nanoparticles via layer-by-layer self-assembly”, *Chemistry – A European Journal*, accepted (2014).

- 3) Sharma, M.K., D. Qi, R.D. Buchner, W.J. Scharmach, V. Papavassiliou, and M.T. Swihart\*, “Flame-driven Aerosol Synthesis of Copper-Nickel Nanopowders and Conductive Nanoparticle Films”, *ACS Applied Materials & Interfaces*, in press, published online (2014). DOI: 10.1021/am5026853
- 4) Lee, J.-G., D.-Y. Kim, J.-J. Park, Y.-H. Cha, J.Y. Yoon, ‡ H.S. Jeon, B.K. Min, M.T. Swihart, S. Jin, S.S. Al-Deyab, and S.S. Yoon\*, “Graphene–Titania Hybrid Photoanodes Produced by Supersonic Kinetic Aerosol Deposition for Solar Water Splitting”, *Journal of the American Ceramic Society*, in press, published online (2014). DOI: 10.1111/jace.13174
- 5) Du, N., M.R. Knecht, M.T. Swihart, Z. Tang, T.R. Walsh, and A. Zhang\*, “Identifying Affinity Classes of Inorganic Materials Binding Sequences via a Graph-based Model”, *IEEE/ACM Transactions on Computational Biology and Bioinformatics*, in press (published online), DOI: 10.1109/TCBB.2014.2321158 (2014).
- 6) Wang, X., X. Liu, D. Zhu, and M.T. Swihart\*, “Controllable Conversion of Plasmonic  $\text{Cu}_{2-x}\text{S}$  Nanoparticles to  $\text{Au}_2\text{S}$  by Cation Exchange and Electron Beam Induced Transformation of  $\text{Cu}_{2-x}/\text{Au}_2\text{S}$  Core/Shell Nanostructures”, *Nanoscale*, **6**, 8852-8857 (2014).
- 7) Lin, T., X. Liu, B. Zhou, Z. Zhan, A.N. Cartwright, and M.T. Swihart\*, “A Solution-Processed UV-Sensitive Photodiode Produced Using a New Silicon Nanocrystal Ink”, *Advanced Functional Materials*, in press, published online (2014). DOI: 10.1002/adfm.201400600
- 8) X. Liu, Y. Li, B. Zhou, X. Wang, A.N. Cartwright, and M.T. Swihart\*, “Shape-Controlled Synthesis of SnE (E=S, Se) Semiconductor Nanocrystals for Optoelectronics”, *Chemistry of Materials*, **26**, 3515–3521 (2014).
- 9) Yoon, H., H.N. Seing, J.Y. Choi, M.W. Kim, H. Kim, H.S. An, B.K. Min, S.J. Ahn, J.H. Yun, J. Gwak, K.H. Yoon, S.S. Kolekar, M.F.A.M. van Hest, S.S. Al-Deyab, M.T. Swihart, and S.S. Yoon\*, “Carbon- and Oxygen-Free  $\text{Cu}(\text{InGa})(\text{SSe})_2$  Solar Cell with a 4.63% Conversion Efficiency by Electrostatic Spray Deposition”, *ACS Applied Materials and Interfaces*, **6**, 8369-8377 (2014).
- 10) Chakrabarti, S. \*, X. Liu, C. Li, P. Banerjee, S. Maitra, and M.T. Swihart, “Synthesis of iron-doped zinc oxide nanoparticles by simple heating: influence of precursor composition and temperature”, *Int. J. Materials Engineering Innovation*, in press (2014).
- 11) Guo, M., W.-C. Law, X. Liu, H. Cai, L. Liu, M.T. Swihart\*, X. Zhang\*, and P.N. Prasad\*, “Plasmonic Semiconductor Nanocrystals as Chemical Sensors:  $\text{Pb}^{2+}$  Quantitation via Aggregation-Induced Plasmon Resonance Shift”, *Plasmonics*, in press, DOI: 10.1007/s11468-014-9694-3 (2014).
- 12) Liu, X. and M.T. Swihart\*, “Heavily-Doped Colloidal Semiconductor and Metal Oxide Nanocrystals: An Emerging New Class of Plasmonic Nanomaterials”, *Chem. Soc. Rev.*, **43**, 3908-3920 (2014).

- 13) Li, Y., Z. Tang, P.N. Prasad, M.R. Knecht,\* and M.T. Swihart\*, “Peptide-mediated Synthesis of Gold Nanoparticles: Effects of Peptide Sequence and Nature of Binding on Physicochemical Properties”, *Nanoscale*, **6**, 3165-3172 (2014).
- 14) Park, J.-J., D.-Y. Kim, J.-G. Lee, M. Swihart, and S.S. Yoon\*, “Supersonic Aerosol-Deposited TiO<sub>2</sub> Photoelectrodes for Photoelectrochemical Solar Water Splitting”, *RSC Advances*, **4**, 8661-8670 (2014).
- 15) Kim, S.\* , J.H. Lee, M.T. Swihart, J.-C. Lee\* , and J.Y. Kim\* , “Silicon nanoparticle size-dependent open circuit voltage in an organic-inorganic hybrid solar cell”, *Current Applied Physics*, **14**, 127-131 (2014).
- 16) Oh, H.S., G.S. He, W.-C. Law, A. Baev, H. Jee, X. Liu, A. Urbas, C.-W. Lee, B.L. Choi, M.T. Swihart, and P.N. Prasad\* , “Manipulating Nanoscale Interactions in a Polymer Nanocomposite for Chiral Control of Linear and Nonlinear Optical Functions”, *Advanced Materials*, **26**, 1607-1611 (2014).
- 17) Tang, Z., J.P. Palafox-Hernandez, W.-C. Law, Z.E. Hughes, M.T. Swihart, P.N. Prasad\* , M.R. Knecht\* , and T.R. Walsh\* , “Biomolecular Recognition Principles for Bionanocombinatorics: An Integrated Approach To Elucidate Enthalpic and Entropic Factors”, *ACS Nano*, **7**, 9632–9646 (2013).
- 18) Lin, T., X. Zhang, J. Xu\* , X. Liu, M.T. Swihart, L. Xu, and K. Chen “Strong energy-transfer-induced enhancement of Er<sup>3+</sup> luminescence in In<sub>2</sub>O<sub>3</sub> nanocrystal codoped silica films”, *Applied Physics Letters*, **103**, 181906 (2013).
- 19) Liu, X., Y. Li, B. Zhou, D. Wang, A.N. Cartwright, and M.T. Swihart\* , “Formation of IV-VI Alloy Nanocrystals for Application in Solution-Processed Optoelectronic Devices: The Case of Pb<sub>1-x</sub>Sn<sub>x</sub>S”, *Chemistry of Materials*, **25**, 4409–4415 (2013).
- 20) Liu, X., X. Wang, and M.T. Swihart\* , “Cu<sub>2-x</sub>S<sub>1-y</sub>Se<sub>y</sub> Alloy Nanocrystals with Broadly Tunable Near-Infrared Localized Surface Plasmon Resonance”, *Chemistry of Materials*, **25**, 4402–4408 (2013).
- 21) Vidal, X., W.J. Kim, A. Baev, V. Tokar, H. Jee, M.T. Swihart, P.N. Prasad\* , “Coupled Plasmons Induce Broadband Circular Dichroism in Patternable Films of Silver Nanoparticles with Chiral Ligands”, *Nanoscale*, **5**, 10550–10555 (2013).
- 22) Liu, X., C. Lee, W.C. Law, D. Zhu, M. Liu, M. Jeon, J. Kim, P.N. Prasad\* , C. Kim\* , M.T. Swihart\* , “Au-Cu<sub>2-x</sub>Se Heterodimer Nanoparticles with Broad Localized Surface Plasmon Resonance as Contrast Agents for Deep Tissue Imaging”, *Nano Letters*, **13**, 4333–4339 (2013).
- 23) Scharmach, W.J., M.K. Sharma, R.D. Buchner, V. Papavassiliou, G.N. Vajani, M.T. Swihart\* , “Amorphous carbon encapsulation of metal aerosol nanoparticles for improved collection and prevention of oxidation” *AIChE Journal*, **59**, 4116–4123 (2013).

- 24) Liu, M., W.-C. Law, A. Kopwitthaya, X. Liu, M.T. Swihart, and P.N. Prasad\*, “Exploring Amphiphilicity of PEGylated Gold Nanorods: Mechanical Phase Transfer and Self-Assembly”, *Chemical Communications*, **49**, 9350-9352 (2013).
- 25) Erogbogbo, F., J. May, M.T. Swihart, P.N. Prasad, K. Smart, S. El Jack, D. Korczyk, M. Webster, R. Stewart, I. Zeng, M. Jullig, K. Bakeev, M. Jamieson, .N Kasabov, B. Gopalan, L. Liang, R. Hu, S. Schliebs, S. Villas-Boas, P. Gladding\*, “Bioengineering Silicon Quantum Dot Theranostics using a Network Analysis of Metabolomic and Proteomic Data in Cardiac Ischemia”, *Theranostics*, **3**, 719-728 (2013).
- 26) Liu, Xin, and M.T. Swihart\*, “A general single-pot heating method for morphology, size and luminescence-controllable synthesis of colloidal ZnO nanocrystals” *Nanoscale*, **5**, 8029-8036 (2013).
- 27) Park, J.J., D.Y. Kim, S.S. Latthe, J.G. Lee, M.T. Swihart, S.S. Yoon\*, “Thermally-Induced Superhydrophilicity in TiO<sub>2</sub> Films Prepared by Supersonic Aerosol Deposition”, *ACS Applied Materials & Interfaces*, **5**, 6155–6160 (2013).
- 28) Liu, J., F. Erogbogbo, K.-T. Yong\*, L. Ye\*, J. Liu, R. Hu, H. Chen, Y. Hu, Y. Yang, J. Yang, I. Roy, N.A. Karker, M.T. Swihart, and P.N. Prasad\*, “Assessing Clinical Prospects of Silicon Quantum Dots: Studies in Mice and Monkeys”, *ACS Nano*, **7**, 7303–7310 (2013).
- 29) Sharma, M.K., R.D. Buchner, W.J. Scharmach, V. Papavassiliou, and M.T. Swihart\*, “Creating Conductive Copper-Silver Bimetallic Nanostructured Coatings using a High Temperature Reducing Jet Aerosol Reactor”, *Aerosol Science and Technology*, **47**, 858-866 (2013).
- 30) He, X., R. Dziak, X.Yuan, K. Mao, R. Genco, M. Swihart, D. Sarkar, C. Li, C. Wang, L. Lu, S. Andreadis, and S. Yang\*, “BMP2 Genetically Engineered MSCs and EPCs Promote Vascularized Bone Regeneration in Rat Critical-Sized Calvarial Bone Defects,” *PLOS One*, **4**, e60473, doi:10.1371/journal.pone.0060473 (2013).
- 31) Liu, X., W.-C. Law, M. Jeon, X. Wang, M. Liu, C. Kim\*, P.N. Prasad\*, and M.T. Swihart\*, “Cu<sub>2-x</sub>Se Nanocrystals with Localized Surface Plasmon Resonance as Sensitive Contrast Agents for *In Vivo* Photoacoustic Imaging: Demonstration of Sentinel Lymph Node Mapping,” *Advanced Healthcare Materials*, **2**, 952-957 (2013).
- 32) Erogbogbo, F., T. Lin, P.M. Tucciarone, K.M. LaJoie, L. Lai, G.D. Patki, P.N. Prasad\*, and M.T. Swihart\*, “On-Demand Hydrogen Generation using Nanosilicon: Splitting Water without Light, Heat, or Electricity”, *Nano Letters*, **13**, 451-456, (2013).
- 33) Yong\*, K.-T., W.-C. Law, R. Hu, L. Ye, L. Liu, M.T. Swihart, and P.N. Prasad\*, “Nanotoxicity assessment of quantum dots: from cellular to primate studies”, *Chem. Soc. Rev.* **42**, 1236-1250 (2013).
- 34) Liu, S., G. Chen, T.Y. Ohulchanskyy, M.T. Swihart\*, and P.N. Prasad\*, “Facile Synthesis and Potential Bioimaging Applications of Hybrid Upconverting and Plasmonic NaGdF<sub>4</sub>: Yb<sup>3+</sup>, Er<sup>3+</sup>/Silica/Gold Nanoparticles”, *Theranostics*, **3**, 275-281 (2013).

- 35) Liu, X., X. Wang, B. Zhou, W.-C. Law, A.N. Cartwright, and M.T. Swihart\*, “Size-Controlled Synthesis of  $\text{Cu}_{2-x}\text{E}$  (E = S, Se) Nanocrystals with Strong Tunable Near-Infrared Localized Surface Plasmon Resonance and High Conductivity in Thin Films”, *Advanced Functional Materials*, **23**, 1256-1264, (2013).
- 36) He, X., R. Dziak, K. Mao, R. Genco, M. Swihart, C. Li, and S. Yang\*, “Integration of a novel injectable nano calcium sulfate/alginate scaffold and BMP2-gene modified MSCs for bone regeneration”, *Tissue Engineering*, **19**, 508-518, (2013).
- 37) He\*, G.S., W.-C. Law, A. Baev, S. Liu, M.T. Swihart, and P.N. Prasad, “Nonlinear optical absorption and stimulated Mie scattering in metallic nanoparticle suspensions”, *J. Chem. Phys.*, **138** 024202 (2013).
- 38) Erogbogbo, F., X. Liu, J.L. May, A. Narain, M.T. Swihart, and P.N. Prasad\*, “Plasmonic gold and luminescent silicon nanoplatforms for multimode imaging of cancer cells”, *Integrative Biology*, **5**, 144-150 (2013).
- 39) Yong, K.-T. and M.T. Swihart\*, “In vivo toxicity of quantum dots: no cause for concern?” (editorial), *Nanomedicine*, **7**, 1641-1643 (2012).
- 40) Yong\*, K.-T., Y. Wang, I. Roy, R. Hu, M.T. Swihart, W.-C. Law, S.K. Kwak, L. Ye, J. Liu, S.D. Mahajan, and J.L. Reynolds, “Preparation of Quantum Dot/Drug Nanoparticle Formulations for Traceable Targeted Delivery and Therapy”, *Theranostics*, **2**, 681-694 (2012).
- 41) Erogbogbo, F., C.-W. Chang, J.L. May, L. Liu, R. Kumar, W.-C. Law, H. Ding, K.-T. Yong, I. Roy, M. Sheshadri, M.T. Swihart and P.N. Prasad\*, “Bioconjugation of luminescent silicon quantum dots to gadolinium ions for bioimaging applications” *Nanoscale*, **4** 5483-5489 (2012).
- 42) Oh, H.S., H. Jee, A. Baev, M.T. Swihart\*, and P.N. Prasad\*, “Dramatic Structural Enhancement of Chirality in Photopatternable Nanocomposites of Chiral Poly(fluorene-alt-benzothiadiazole) (PFBT) in Achiral SU-8 Photoresist”, *Advanced Functional Materials*, **22** 5074-5080 (2012).
- 43) Erogbogbo, F., C.-W. Chang, J.L. May, P.N. Prasad and M.T. Swihart\*, “Energy transfer from a dye donor to enhance the luminescence of silicon quantum dots”, *Nanoscale*, **4**, 5163-5168 (2012).
- 44) May, J.L., F. Erogbogbo, K.-T. Yong, H. Ding, W.-C. Law, M.T. Swihart, P.N. Prasad\*, “Enhancing silicon quantum dot uptake by pancreatic cancer cells via pluronic® encapsulation and antibody targeting”, *Journal of Solid Tumors*, **2**, 24-37 (2012).
- 45) Ye\*, L., K.-T. Yong\*, L. Liu, I. Roy, R. Hu, J. Zhu, H. Cai, W.-C. Law, J. Liu, K. Wang, J. Liu, Y. Liu, Y. Hu, X. Zhang, M.T. Swihart, and P.N. Prasad\*, “A pilot study in non-human primates shows no adverse response to intravenous injection of quantum dots”, *Nature Nanotechnology*, **7**, 453–458 (2012).
- 46) Chen, G., T.Y. Ohulchanskyy, S. Liu, W.-C. Law, F. Wu, M.T. Swihart, H. Ågren, and P.N. Prasad\*, “Core/Shell  $\text{NaGdF}_4:\text{Nd}^{3+}/\text{NaGdF}_4$  Nanocrystals with Efficient Near-Infrared

- to Near-Infrared Downconversion Photoluminescence for Bioimaging Applications”, *ACS Nano*, **6**, 2969-2977 (2012).
- 47) Kim, S., K. Jeon, J.C. Lee, M.T. Swihart, and M. Yang\*, “Enhanced Performance of a Polymer Solar Cell upon Addition of Free-Standing, Freshly Etched, Photoluminescent Silicon Nanocrystals”, *Appl. Phys. Exp.*, **5** 022302 (2012).
  - 48) Erogbogbo, F., T. Liu, N. Ramadurai, P. Tuccarione, L. Lai, M.T. Swihart\*, and P.N. Prasad\*, “Creating Ligand-Free Silicon Germanium Alloy Nanocrystal Inks”, *ACS Nano*, **5** 7950-7959 (2011).
  - 49) Liu, S., G. Chen, P.N. Prasad, and M.T. Swihart\*, “Synthesis of Monodisperse Au, Ag, and Au–Ag Alloy Nanoparticles with Tunable Size and Surface Plasmon Resonance Frequency,” *Chem. Mater.*, **23** 4098-4101 (2011).
  - 50) Park, Y.-B., K. Mohan, A.Al-Sanousi, B. Almaghrabi, R.J. Genco, M.T. Swihart, and R. Dziak\*, “Synthesis and Characterization of Nanocrystalline Calcium Sulfate for Use in Osseous Regeneration,” *Biomedical Materials*, **6** 055003 (2011).
  - 51) Erogbogbo, F., C.-A. Tien, C.-W.Chang, K.-T. Yong, W.-C. Law H. Ding, I. Roy, M.T. Swihart\*, and P.N. Prasad\*, “Bioconjugation of Luminescent Silicon Quantum Dots for Selective Uptake by Cancer Cells”, *Bioconjugate Chemistry*, **22** 1081-1088 (2011).
  - 52) Antipov, A., M. Bell, M. Yasar, V. Mitin\*, W. Scharmach, M. Swihart, A. Verevkin, and A. Sergeev, “Luminescence of colloidal CdSe/ZnS nanoparticles: high sensitivity to solvent phase transitions”, *Nanoscale Research Letters*, **6** 142 (2011).
  - 53) Kim, W.-J., X. Vidal, A. Baev, H.S. Jee, M.T. Swihart, and P.N. Prasad\*, “Photothermal-reaction-assisted two-photon lithography of silver nanocrystals capped with thermally cleavable ligands”, *Applied Physics Letters*, **98** 133110 (2011).
  - 54) Shukla, S., X. Vidal, E.P. Furlani, M.T. Swihart, K.-T. Kim, Y.-K. Yoon, A. Urbas, and P.N. Prasad\*, “Subwavelength Direct Laser Patterning of Conductive Gold Nanostructures by Simultaneous Photopolymerization and Photoreduction”, *ACS Nano*, **5** 1947–1957 (2011).
  - 55) Yong\*, K.-T., W.-C. Law, I. Roy, Z. Jing, H. Huang, M.T. Swihart, and P.N. Prasad\*, “Aqueous phase synthesis of CdTe quantum dots for biophotonics” *Journal of Biophotonics*, **4**(1-2) 9 (2011).
  - 56) Erogbogbo, F., K.-T. Yong, I. Roy, R. Hu, W.-C. Law, W. Zhao, H. Ding, F. Wu, R. Kumar, M.T. Swihart\*, and P.N. Prasad\*, “In Vivo Targeted Cancer Imaging, Sentinel Lymph Node Mapping and Multi-Channel Imaging with Biocompatible Silicon Nanocrystals” *ACS Nano*, **5**(1), 413–423 (2011).
  - 57) Oh, H.S., S. Liu, H.S. Jee, A. Baev, M.T. Swihart, and P.N. Prasad\* “Chiral Poly(fluorene-alt-benzothiadiazole) (PFBT) and Nanocomposites with Gold Nanoparticles: Plasmonically and Structurally Enhanced Chirality”, *Journal of the American Chemical Society*, **132**(49) 17346–17348 (2010).
  - 58) Scharmach, W.J., R.D. Buchner, V. Papavassiliou, P. Pacouloute, and M.T. Swihart\*, “A High-Temperature Reducing Jet Reactor for Flame-Based Metal Nanoparticle Production”, *Aerosol Science and Technology*, **44**(12), 1083-1088 (2010).

- 59) Erogbogbo, F., K.-T. Yong, R. Hu, W.-C. Law, H. Ding, C.-W. Chang, P.N. Prasad\*, and M.T. Swihart\*, “Biocompatible Magnetofluorescent Probes: Luminescent Silicon Quantum Dots Coupled with Superparamagnetic Iron(III) Oxide”, *ACS Nano*, **4**, 5131-5138 (2010).
- 60) Shukla, S., E.P. Furlani, X. Vidal, M.T. Swihart, and P.N. Prasad\*, “Two-Photon Lithography of Sub-Wavelength Metallic Structures in a Polymer Matrix”, *Advanced Materials*, **22**, 3695-3699 (2010).
- 61) Rinkevicius, Z., J. Autschbach, A. Baev, M.T. Swihart, H. Ågren, and P.N. Prasad\*, “Novel Pathways for Enhancing Nonlinearity of Organics Utilizing Metal Clusters”, *Journal of Physical Chemistry A*, **114**, 7590-7594 (2010).
- 62) Zhu, J., K.-T. Yong\*, I. Roy, R. Hu, H. Ding, M.T. Swihart, G.S. He, Y. Cui\*, and P.N. Prasad\*, “Additive controlled synthesis of gold nanorods (GNRs) for two-photon luminescence imaging of cancer cells”, *Nanotechnology*, **21**, 285106 (2010).
- 63) Liu, S., H. Zhang and M.T. Swihart\*, “Spray pyrolysis synthesis of ZnS nanoparticles from a single-source precursor”, *Nanotechnology*, **20**, 235603 (2009).
- 64) Hsiao, V.K.S., K.-T. Yong, A.N. Cartwright\*, M.T. Swihart, P.N. Prasad, P.F. Lloyd and T.J. Bunning, “Nanoporous polymeric photonic crystals by emulsion holography”, *Journal of Materials Chemistry*, **19**, 3998-4003 (2009).
- 65) K.-T. Yong, I. Roy, M.T. Swihart and P.N. Prasad, “Multifunctional nanoparticles as biocompatible targeted probes for human cancer diagnosis and therapy”, *Journal of Materials Chemistry*, **19**, 4655-4672 (2009).
- 66) Yong, K.-T., M.T. Swihart\*, H. Ding and P.N. Prasad, “Preparation of Gold Nanoparticles and their Applications in Anisotropic Nanoparticle Synthesis and Bioimaging”, *Plasmonics*, **4**, 79-93 (2009).
- 67) Gupta, A., M.T. Swihart\*, and H. Wiggers\*, “Luminescent Colloidal Dispersions of Silicon Quantum Dots from Microwave Plasma Synthesis: Exploring the Photoluminescence Behavior across the Visible Spectrum” *Advanced Functional Materials*, **19**, 696-703 (2009). Also featured on the front cover, *Advanced Functional Materials*, **19**(5) (2009).
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- 69) Dang, H. and M.T. Swihart\*, “Computational Modeling of Silicon Nanoparticle Synthesis: I. A General Two-Dimensional Model”, *Aerosol Science and Technology*, **43**, 250-263 (2009).
- 70) He, S, H. Zhang, S. Delikanli, Y. Qin, M.T. Swihart, and H. Zeng\*, “Bifunctional Magneto-Optical FePt-CdS Hybrid Nanoparticles” *Journal of Physical Chemistry C*, **113**, 87-90 (2009).
- 71) Zhang, H., S. Delikanli, Y. Qin, S. He, M. Swihart, and H. Zeng\*, “Synthesis of Monodisperse CdS Nanorods Catalyzed by Au Nanoparticles”, *Nano Research*, **1**, 314-320 (2008).

- 72) Delikanli, S., S. He, Y. Qin, P. Zhang, H. Zeng\*, H. Zhang, and M. Swihart, "Room temperature ferromagnetism in Mn-doped CdS nanorods", *Applied Physics Letters*, **93**, 132501 (2008).
- 73) Osmont, A., M. Yahyaoui, L. Catoire\*, I. Gökcalp, and M.T. Swihart, "Thermochemistry of C–O, (CO)–O, and (CO)–C bond breaking in fatty acid methyl esters", *Combustion and Flame*, **155**, 334-342 (2008).
- 74) He\*, G.S., Q. Zheng, K.-T. Yong, F. Erogbogbo, M.T. Swihart, and P.N. Prasad, "Two- and Three-Photon Absorption and Frequency Upconverted Emission of Silicon Quantum Dots", *Nano Letters*, **8**, 2688-2692 (2008).
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### III. Book Chapters

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- 2) Mark T. Swihart, "Silicon Nanoparticles for Biophotonics", Chapter 4 in *Nanotechnology in Biology and Medicine: Methods, Devices, and Applications*, edited by Tuan Vo Dinh, CRC Press, 2007.
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### IV. Proceedings Volumes Edited

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- 2) Swihart, M. T., R. Schmid, C. Wolden, D.G. Goodwin, and M. Sugiyama Editors. "Fundamental Gas-Phase and Surface Chemistry of Vapor-Phase Materials Processing 3", (Symposium held at the 2006 Spring ECS Meeting in Denver, CO.) *ECS Transactions*, **2(7)**, 290 pp. (2007).
- 3) Swihart, M. T.; Allendorf, M. D.; Meyyappan, M.; Editors. "Fundamental Gas-Phase and Surface Chemistry of Vapor-Phase Deposition II and Process Control, Diagnostics, and Modeling in Semiconductor Manufacturing IV" *Proceedings of the Electrochemical Society*, **2001-13**, 508 pp. (2001).

## V. Invited Presentations

- 1) Swihart, M.T., “Semiconductor Nanocrystals Based on Non-Toxic Earth-Abundant Elements for Optoelectronics”, Key Laboratory of Magnetic Molecules and Magnetic Information Materials, Shanxi Normal University (山西师范大学), Linfen, China, July 1, 2014.
- 2) Swihart, M.T., “Semiconductor Nanocrystals Based on Non-Toxic Earth-Abundant Elements for Optoelectronics”, National Laboratory of Solid State Microstructures, Nanjing University (南大), Nanjing, China, June 28, 2014.
- 3) Swihart, M.T., “Synthesis and Potential Applications of Metal and Semiconductor Nanoparticles”, and “Semiconductor Nanocrystals Based on Non-Toxic Earth-Abundant Elements for Optoelectronics”, Nanjing University of Science and Technology (南京理工大学), Nanjing, China, June 27, 2014.
- 4) Swihart, M.T., “Aerosol Synthesis and Potential Applications of Metal and Semiconductor Nanoparticles”, Washington University in St. Louis, January 17, 2014.
- 5) Swihart, M.T., “The Production and Use of Semiconductor Nanocrystals for Optical Bioimaging”, The 15th Beijing Conference and Exhibition on Instrumental Analysis, Beijing, China, October 24, 2013.
- 6) Swihart, M.T., “The Production and Use of Semiconductor Nanocrystals for Optical Bioimaging”, Southwest University, Chongqing, China, October 22, 2013.
- 7) Liu, X., X. Wang, T. Lin, Y. Li, C. Li, B. Zhou, A.N. Cartwright, and M.T. Swihart, “Semiconductor Nanocrystals Based on Non-Toxic Earth-Abundant Elements for Optoelectronics”, Peking University, Beijing, China, September 27, 2013.
- 8) Liu, X., X. Wang, T. Lin, Y. Li, C. Li, B. Zhou, A.N. Cartwright, and M.T. Swihart, “Semiconductor Nanocrystals Based on Non-Toxic Earth-Abundant Elements for Optoelectronics”, International Union of Materials Research Societies (IUMRS) International Conference on Advanced Materials, Qingdao, China, September 24, 2013.
- 9) Sharma, M.K., W.J. Scharmach, R.D. Buchner, D. Qi, V. Papavassiliou, and M.T. Swihart, “Scalable Flame-Based Synthesis of Multicomponent Metal Nanoparticles”, 9<sup>th</sup> World Congress of Chemical Engineering, Seoul, Korea, August 21, 2013.
- 10) Swihart, M.T., “Synthesis and Surface Modification of Nanocrystals of Silicon and other Earth-Abundant Semiconductors for Photovoltaics”, Ulsan National Institute of Science and Technology, Ulsan, Korea, January 9, 2012.
- 11) Swihart, M.T., “Colloids of luminescent silicon nanocrystals: Synthesis, functionalization, and applications in bioimaging”, Symposium in Honor of Eli Ruckenstein at 86: Colloid and Surface Chemistry: Looking Back and Looking Forward, American Chemical Society National Meeting, Denver, Colorado, August 28, 2011.

- 12) Swihart, M.T., "Luminescent Silicon Nanocrystals: Synthesis, Functionalization, and Applications", Photovoltaics Research Center, Korea Institute for Energy Research, Daejeon, Korea, August 24, 2010.
- 13) Swihart, M.T. "Luminescent Silicon Nanocrystals: Synthesis, Functionalization, and Applications in Bioimaging", Bonsai Project Symposium "Breakthroughs in Nanoparticles for Bio-Imaging", ENEA Research Center of Frascati, Frascati (Rome), Italy, April 9, 2010.
- 14) Swihart, M.T., F. Erogbogbo, C.A. Tien, S.J. Kim, and A.N. Cartwright, "Synthesis and Surface Modification of Silicon Nanocrystals for Photovoltaics", MRS 2010 Spring Meeting, San Francisco, California, April 6, 2010.
- 15) Swihart, M.T. "Luminescent Silicon Nanocrystals: Synthesis, Functionalization, and Applications", Department of Chemistry, Tulane University, March 8, 2010.
- 16) Swihart, M.T., "Synthesis of Metal and Semiconductor Nanoparticles in the Gas Phase", Particle Technology Laboratory, ETH (Swiss Federal Institute of Technology), Zurich, Switzerland, October 12, 2009.
- 17) Swihart, M.T., "Photoluminescent Silicon Nanocrystals: Aerosol Synthesis, Surface Functionalization, and Applications", Institute of Chemical Biology and State Key Laboratory for Agricultural Microbiology, Huazhong Agricultural University, Wuhan, China, June 26, 2009.
- 18) Swihart, M.T., "Photoluminescent Silicon Nanocrystals: Aerosol Synthesis, Surface Functionalization, and Applications", Department of Chemistry and Institute of Chemical Biology, Wuhan University, Wuhan, China, June 24, 2009.
- 19) Swihart, M.T., "Photoluminescent Silicon Nanocrystals: Aerosol Synthesis, Surface Functionalization, and Applications", Department Seminar Series, Chemical Engineering, The University of Massachusetts at Amherst, May 5, 2009.
- 20) Swihart, M.T., "Biocompatible silicon quantum dots for biophotonics", The Third iCeMS International Symposium: "MESO CONTROL of the cells, by the cells, for the cells", Kyoto, Japan, January 28, 2009.
- 21) Swihart, M.T., "Photoluminescent Silicon Nanocrystals: Aerosol Synthesis, Surface Functionalization, and Applications", 2<sup>nd</sup> International Workshop on Semiconductor Nanoparticles for Photovoltaics and Optoelectronics, Duisburg, Germany, December 11, 2008.
- 22) Swihart, M.T., "Nanoparticle Synthesis", Invited tutorial, American Association of Aerosol Research Annual Meeting, Orlando, Florida, October 20, 2008.
- 23) Swihart, M.T., and F. Erogbogbo, "Photoluminescent Silicon Nanocrystals: Aerosol Synthesis, Surface Functionalization, and Applications", 91<sup>st</sup> Canadian Chemistry Conference, Edmonton, Alberta, Canada, May 27, 2008.

- 24) Swihart, M.T., "Photoluminescent Silicon Nanocrystals: Aerosol Synthesis, Surface Functionalization and Applications", Dept. of Chemical and Biomolecular Engineering, The University of Maryland, Oct. 16, 2007.
- 25) Swihart, M.T., "Nanoparticle Synthesis in the Swihart Group at The University at Buffalo (SUNY)", General Meeting of the International Fine Particle Research Institute, June 28, 2006, Santa Barbara, California.
- 26) Swihart, M.T., "Better Living through Nanomaterials: Past, Present, and Future", UB Department of Electrical Engineering, January 27, 2006.
- 27) Swihart, M.T., "Preparation of Organically-Capped Silicon Quantum Dots", Brockhouse Institute for Materials Research, McMaster University, Ontario, Canada, November 14, 2005.
- 28) Swihart, M.T., "Vapor-Phase Synthesis of Nanoparticles", China/USA/Japan Joint Chemical Engineering Conference, Beijing, China, October 14, 2005.
- 29) Swihart, M.T., "Better Living through Nanomaterials: Past, Present, and Future", UB This Summer Lecture Series, June 16, 2005.
- 30) Swihart, M.T., "Production and Surface Functionalization of Macroscopic Quantities of Brightly Photoluminescent Silicon Nanoparticles and Magnetic Metal Nanoparticles", ECI Conference on "Nanoparticles from the Vapor Phase with Chemical and Biochemical Applications", Davos, Switzerland, August 10, 2004.
- 31) Li, X., Y. He, and M.T. Swihart, "Production and surface functionalization of macroscopic quantities of brightly photoluminescent silicon nanoparticles", University of Minnesota, IGERT program in nanoparticle technology, March 26, 2004.
- 32) Li, X., Y. He, and M.T. Swihart, "Production and surface functionalization of macroscopic quantities of brightly photoluminescent silicon nanoparticles", Dow Corning Corporation, Midland, MI, February 16, 2004.
- 33) Swihart, M.T., "J.B. Wagner Award Address: Assembling Gas-Phase Reaction Mechanisms for High Temperature Inorganic Systems Based on Quantum Chemistry Calculations and Reaction Rate Theories", 204<sup>th</sup> meeting of the Electrochemical Society, October 14, 2003, Orlando, Florida.
- 34) Swihart, M.T., "High-Rate Synthesis and Characterization of Brightly Luminescent Silicon Nanoparticles with Applications in Hybrid Materials for Photonics and Biophotonics", presented at a symposium entitled "Organic and Hybrid Materials for Nanophotonics" at the 48th Annual Meeting of the SPIE, August 4-5, 2003, San Diego, California.
- 35) Swihart, M.T., "Assembling Gas-Phase Reaction Mechanisms for High Temperature Inorganic Systems Based on Quantum Chemistry Calculations and Reaction Rate Theories", presented as an *invited keynote lecture* at The IUPAC Conference on High Temperature Materials Chemistry – XI, May 19-23, 2003, Tokyo, Japan.

- 36) Swihart, M.T., "Preparing and Functionalizing Macroscopic Quantities of Brightly Photoluminescent Silicon Nanoparticles with Emission Spanning the Visible Spectrum", May 20, 2003, Department of Chemical Systems Engineering, University of Tokyo.
- 37) Swihart, M.T., "High-Rate Synthesis, Characterization, and Potential Applications of Brightly Luminescent Silicon Nanoparticles", at the International Symposium on Structure and Dynamics of Heterogeneous Systems, Gerhard-Mercator-Universität Duisburg, November 29, 2002, Duisburg, Germany.
- 38) Swihart, M.T., "Experimental and Modeling Studies on the Nucleation and Growth of Silicon Nanoparticles from the Vapor Phase", IT Collaboratory Teleconference Series, Held at University at Buffalo and broadcast to Rochester Institute of Technology and Alfred University, January, 2002.
- 39) Swihart, M.T., "Experimental and Modeling Studies on the Nucleation and Growth of Silicon Nanoparticles from the Vapor Phase", Department of Electrical Engineering, University at Buffalo, April, 2002.
- 40) Swihart, M.T. "Chemical Kinetic Studies of the Homogeneous Chemical Nucleation of Silicon Nanoparticles", at a workshop entitled "Precursor materials, clusters and nanoparticles: Experiment and theory", Gerhard-Mercator-Universität Duisburg, October 5, 2000, Duisburg, Germany.

## **VI. Patents and Pending Patent Applications**

- 1) Yong, K.-T., Y. Sahoo, M.T. Swihart, and P.N. Prasad, "Non-spherical Semiconductor Nanocrystals and Methods of Making Them", pending application # 20070186846, filed December 21, 2006. Licensed to Solexant, Inc., Santa Clara, CA.
- 2) Ruckenstein, E., M.T. Swihart, and F. Hua, "Production of Photoluminescent Silicon Nanoparticles having Surfaces that are Essentially Free of Residual Oxygen", U.S. Patent No. 8,029,698 (2011).
- 3) Park, Y., R. Dziak, R. Genco, M.T. Swihart, and H. Periopanayagam, "Calcium Sulfate Based Nanoparticles", U.S. Patent No. 7,767,226 (2010).
- 4) Li, X., Y. He, and M.T. Swihart, "Process for Producing Luminescent Silicon Nanoparticles", U.S. Patent No. 7,371,666 (2008).
- 5) Becker, C.L., J.R. Lattner, and M.T. Swihart, "Fluidized Bed Reactor and Process", U.S. Patent No. 6,627,068 (2003).
- 6) Becker, C.L., J.R. Lattner, and M.T. Swihart, "Fluidized Bed Reactor and Process for Producing 5-Ethylidene-2-Norbornene", U.S. Patent No. 6,294,707 (2001).

## **ORGANIZATIONAL MEMBERSHIPS**

Member, The Electrochemical Society (ECS), American Institute of Chemical Engineers (AIChE), The American Association for the Advancement of Science (AAAS), The American Chemical Society (ACS), The American Association for Aerosol Research

(AAAR), The Materials Research Society (MRS), Tau Beta Pi, Phi Beta Kappa, and Sigma Xi

## UNIVERSITY AND PROFESSIONAL SERVICE

### I. Professional and Public Service

Manuscript reviewer for *Science*, *Nature*, *Nature Communications*, *Advanced Materials*, *Journal of the American Chemical Society*, *Nano Letters*, *Advanced Functional Materials*, *Science Translational Medicine*, *Chemistry of Materials*, *Small*, *Langmuir*, *The Journal of Physical Chemistry (A, B, and C)*, *Bioconjugate Chemistry*, *Applied Physics Letters*, *Industrial and Engineering Chemistry Research*, *AIChE Journal*, *Chemistry: An Asian Journal*, *The Journal of Chemical Physics*, *The Journal of the Electrochemical Society*, *The Journal of Materials Science*, *Chemical Vapor Deposition*, *The International Journal of Chemical Kinetics*, *The Journal of Crystal Growth*, *Crystal Growth and Design*, *CrystEngComm*, *The Journal of Computational Chemistry*, *Journal de Physique IV*, *The Journal of Aerosol Science*, *Aerosol Science and Technology*, *The Journal of Nanoparticle Research*, *Surface Science*, *The Journal of Applied Physics*, *Applied Physics Letters*, *Physica E*, *The Journal of Nanophotonics*, *The Journal of Thermal Spray Technology*, *The International Journal of Chemical Reaction Engineering*, *The Journal of Colloid and Interface Science*, *Colloids and Surfaces A*, *Colloids and Surfaces B*, *Applied Catalysis B*, *Ceramics International*, and *Applied Physics A*, *Nanoscale*.

Proposal reviewer/panelist for The U.S. National Science Foundation, the U.S. Department of Energy, the ACS Petroleum Research Fund, The Air Force Office of Scientific Research, The Swiss Federal Institute of Technology (ETH), the Dutch Technology Foundation (STW), AXA Research Fund, King Abdulaziz City for Science and Technology (KACST), and The U.S. Civilian Research and Development Foundation.

Conference Chair, 2016 Annual Meeting of the American Association for Aerosol Research, to be held in Portland, Oregon (4-year commitment from 2014 through 2017 meetings, in a series of roles ending with “past-chair”).

Member of the Organizing Committee and Proceedings Editor for CVD-XVII/EUROCV D 17 held in October 2009 in Vienna Austria, in conjunction with the 216<sup>th</sup> meeting of the Electrochemical Society.

Lead organizer and proceedings editor for ‘The Third International Symposium on Fundamental Gas-Phase and Surface Chemistry of Vapor-Phase Materials Processing’, held at the 209<sup>th</sup> Meeting of The Electrochemical Society, May 2006, Denver, Colorado.

Member of the Organizing Committee for CVD-XVI/EUROCV D 14, held April 28-May 3, 2003 in Paris, France, in conjunction with the 203<sup>rd</sup> meeting of the Electrochemical Society.

Lead organizer and proceedings editor for ‘The Second International Symposium on Fundamental Gas-Phase and Surface Chemistry of Vapor-Phase Materials Processing’, held at the Electrochemical Society National Meeting, March 2001, Washington, D.C.

Member of the Executive Committee of the High Temperature Materials division of the Electrochemical Society, 1999-2013.

Member of the Editorial Advisory Board of the *International Journal of Chemical Kinetics*, 2001-2004.

Member of the Editorial Advisory Board of *Aerosol Science and Technology*, 2008-2010.

Member of the Board of Consulting Editors, *AIChE Journal*, 2012-present.

Editor, *Aerosol Science and Technology*, 2010-present.

## **II. University Service**

Co-Director, New York State Center of Excellence in Materials Informatics (2012-present)

Director, UB2020 Strategic Strength in Integrated Nanostructured Systems (August 2007-present)

Director of Graduate Studies for Chemical and Biological Engineering (2003-2007, 2011-2013)

Member of the A.A. Schomburg Fellowship selection committee (2006-2013)

Chair of Departmental Safety Committee (2001-2004)

Member of Departmental Undergraduate Studies Committee (2000-2003)

AIChE Student Chapter Advisor (1998-2005)

Freshman Engineering Mentor (1998-2009)

Freshman Honors Program Mentor (1998-present)

University Library Committee Representative (1998-2005)

Departmental Research Open House Organizing Committee (1998-2003)

Lead organizer of the “Workshop on Multifunctional Nanomaterials and Nanodevices” held May 18-19, 2007 at The University at Buffalo (SUNY).

Co-organizer of a workshop entitled “Nanotechnology for Detection and Manipulation of Single Molecules”, held May 30, 2003 at UB

Deputy Director, Materials Division, The Institute for Lasers, Photonics, and Biophotonics (2002-present).

## **FORMAL TEACHING ACTIVITIES**

### **Fall 2013:**

**Instructor**, CE 456/556, Introduction to Aerosol Science and Technology, University at Buffalo, (3 credits, enrollment: 37 students).

- Taught this dual-listed undergraduate/graduate course for the fourth time.

### **Spring 2013:**

**Instructor**, CE 304, Chemical Engineering Thermodynamics, University at Buffalo, (4 credits, enrollment: 75 students).

- Had full responsibility for required, core undergraduate course in chemical engineering thermodynamics.

**Fall 2012:**

**Instructor**, CE 456/556, Introduction to Aerosol Science and Technology, University at Buffalo, (3 credits, enrollment: 16 students).

- Taught this dual-listed undergraduate/graduate course for the fourth time.

**Spring 2012:**

**Instructor**, CE 304, Chemical Engineering Thermodynamics, University at Buffalo, (4 credits, enrollment: 72 students).

**Co-Instructor**, CE 407, Separation Processes, University at Buffalo, (3 credits, enrollment 65 students).

- Taught the second half of the course, covering batch distillation, liquid-liquid extraction, membrane separation, and related material.

**Spring 2011:**

**Instructor**, CE 304, Chemical Engineering Thermodynamics, University at Buffalo, (4 credits, enrollment: 62 students).

**Fall 2010:**

**Instructor**, CE 456/556, Introduction to Aerosol Science and Technology, University at Buffalo, (3 credits, enrollment: 20 students).

**Spring 2010:**

**Instructor**, CE 304, Chemical Engineering Thermodynamics, University at Buffalo, (4 credits, enrollment: 55 students).

**Fall 2009:**

**Instructor**, CE 561, Applied Chemical Kinetics, University at Buffalo, (5 credits, enrollment: 38 students).

- Had full responsibility for required, core graduate course in chemical kinetics and reaction engineering.

**Spring 2009:**

**Instructor**, CE 304, Chemical Engineering Thermodynamics, University at Buffalo, (4 credits, enrollment: 47 students).

**Fall 2008:**

**Instructor**, CE 561, Applied Chemical Kinetics, University at Buffalo, (4 credits, enrollment: 22 students).

**Spring 2008:**

**Instructor**, CE 304, Chemical Engineering Thermodynamics, University at Buffalo, (4 credits, enrollment: 47 students).

**Fall 2007:**

**Instructor**, CE 561, Applied Chemical Kinetics, University at Buffalo, (4 credits, enrollment: 27 students).

**Spring 2007:**

**Instructor**, CE 304, Chemical Engineering Thermodynamics, University at Buffalo, (4 credits, enrollment: 35 students).

**Fall 2006:**

**Instructor**, CE 561, Applied Chemical Kinetics, University at Buffalo, (4 credits, enrollment: 20 students).

**Spring 2006:**

**Instructor**, CE 304, Chemical Engineering Thermodynamics, University at Buffalo, (4 credits, enrollment: 44 students).

**Spring 2005:**

**Instructor**, CE 304, Chemical Engineering Thermodynamics, University at Buffalo, (4 credits, enrollment: 46 students).

- Had full responsibility for required, core undergraduate course in chemical engineering thermodynamics.
- Introduced, in collaboration with David Kofke and staff from the Center for Technical Communications, a major technical writing assignment based on a ‘virtual experiment’ carried out using molecular simulations.

**Instructor**, CE 456/556, Introduction to Aerosol Science and Technology, University at Buffalo, (3 credits, enrollment: 20 students).

- Taught this dual-listed undergraduate/graduate course for the second time. It was previously offered as CE412/512 (a special topics course number) as described below.

**Fall 2004:**

**Advisor**, CE 406 SWI, AIChE Student Chapter ‘Chem-E-Car Competition’, University at Buffalo, (3 credits, enrollment: 16 students).

**Spring 2004:**

**Instructor**, CE 304, Chemical Engineering Thermodynamics, University at Buffalo, (4 credits, enrollment: 61 students).

- Had full responsibility for required, core undergraduate course in chemical engineering thermodynamics.
- Developed course web page including typed course notes, almost 200 additional pages of solved problems, and various other resources.
- Actively used the course web page and various computer demonstrations during lectures, which were given in a 'technology' classroom with computer projection facilities.

**Instructor**, CE 512, Chemically Reacting Flows, University at Buffalo, (3 credits, enrollment: 6 students).

- Developed an entirely new elective course at the advanced graduate level.

### **Fall 2003:**

**Instructor**, CE 561, Applied Chemical Kinetics, University at Buffalo, (4 credits, enrollment: 18 students).

- Had full responsibility for required, core graduate course in chemical kinetics and reaction engineering.
- Developed (from 1998-2003) new course notes, incorporating microscopic views of kinetics and modern computer-based methods of analysis for both chemical kinetics and detailed modeling of complex reactors.
- Developed (from 1998-2003) course web page including over 300 typed pages of course notes, almost 200 additional pages of solved problems, and various other resources.
- Actively used the course web page and various computer demonstrations during lectures, which were given in a 'technology' classroom with computer projection facilities.

**Advisor**, CE 406 SWI, AIChE Student Chapter 'Chem-E-Car Competition, University at Buffalo, (3 credits, enrollment: 11 students).

### **Spring 2003:**

**Instructor**, CE 304, Chemical Engineering Thermodynamics, University at Buffalo, (4 credits, enrollment: 39 students).

**Instructor**, CE 412/512, Introduction to Aerosol Science and Technology, University at Buffalo, (3 credits, enrollment: 30 students).

- Developed an entirely new elective course at the senior undergraduate/first-year graduate level.
- Developed course web page including typed course notes, solved problems, and various other resources.
- Brought the entire class to my research laboratory for a demonstration of modern aerosol science instrumentation, and also gave several simpler in-class demonstrations.

### **Fall 2002:**

**Instructor**, CE 561, Applied Chemical Kinetics, University at Buffalo, (4 credits, enrollment: 15 students).

**Advisor**, CE 406 SWI, AIChE Student Chapter 'Chem-E-Car Competition, University at Buffalo, (3 credits, enrollment: 7 students).

**Spring 2002:**

**Instructor**, CE 304, Chemical Engineering Thermodynamics, University at Buffalo, (4 credits, enrollment: 47 students).

**Fall 2001:**

**Instructor**, CE 561, Applied Chemical Kinetics, University at Buffalo, (4 credits, enrollment: 21 students).

**Spring 2001:**

**Instructor**, CE 328, Chemical Engineering Laboratory II, University at Buffalo, (1 credit, enrollment: 50 students).

- Re-structured laboratory experiments to include computer-aided data acquisition using graphical programming in the LabView data acquisition environment.
- Developed and applied a rubric-based assessment system for measuring student performance.

**Fall 2000:**

**Instructor**, CE 561, Applied Chemical Kinetics, University at Buffalo, (4 credits, enrollment: 10 students).

**Spring 2000:**

**Instructor**, CE 328, Chemical Engineering Laboratory II, University at Buffalo, (1 credit, enrollment: 38 students).

**Advisor**, CE 406 SWI, AIChE Student Chapter Team Competition, University at Buffalo, (3 credits, enrollment: 20 students).

**Instructor**, CE 502 SWI, Introduction to Matlab and Maple for Scientific Problem Solving, University at Buffalo, (1 credit, enrollment: 6 students).

**Fall 1999:**

**Instructor**, CE 561, Applied Chemical Kinetics, University at Buffalo, (4 credits, enrollment: 20 students).

**Spring 1999:**

**Instructor**, CE 328, Chemical Engineering Laboratory II, University at Buffalo, (1 credit, enrollment: 52 students).

**Advisor**, CE 406 SWI, AIChE Student Chapter Environmental Design Contest, University at Buffalo, (3 credits, enrollment: 13 students).

**Instructor**, CE 502 SWI, Introduction to Matlab and Maple for Scientific Problem Solving, University at Buffalo, (1 credit, enrollment: 7 students).

**Fall 1998:**

**Instructor**, CE 561, Applied Chemical Kinetics, University at Buffalo, (4 credits, enrollment: 22 students).

**STUDENTS ADVISED**

**Former Graduate Students:**

Xuegeng Li, Ph.D. conferred February 2004. Currently CEO, Optony Solar.

Suddha Talukdar, Ph.D. conferred February 2004. Currently at Intel.

Yuanqing (Emily) He, Ph.D. conferred February 2006. Currently at Sabic Innovative Plastics.

Ken-Tye Yong, Ph.D. conferred September 2006. Currently Asst. Prof., Nanyang Tech. Univ.

Weili Shi, Ph.D. conferred February 2007. Currently CEO, DK Electronic Materials

Hongwang Zhang, Ph.D. conferred February 2008. Currently DK Electronic Materials

Hongyi Dang, Ph.D. conferred February 2009. Currently at Technip, Houston, TX.

Folarin Erogbogbo, Ph.D. conferred June 2009. Asst. Prof., San Jose State University

William Scharmach, Ph.D. conferred June 2011. Currently at Praxair, Inc.

Sha Liu, Ph.D. conferred September 2011. Currently in Boston, MA (stay-at-home mom)

Munish Sharma, Ph.D. conferred September 2013. Currently at Honeywell

Xin Liu, Ph.D. conferred February 2014, Currently post-doc at Lawrence Berkeley National Labs

Zhen Liu, M.S. conferred September 2000. Currently at Merck, Philadelphia, PA.

Vi Dat "Victor" Tu, M.S. conferred September 2001. Currently at the EPA in New York City.

Carla Ng, M.S. conferred January 2003. Currently lecturer at ETH Zurich.

Juan Carlos Alva Nieta, M.S. conferred June 2003. Currently at Azko Nobel, Utrecht

Kar-Chan Choong, M.S. conferred September 2003. Currently at Eli Lilly, Indianapolis, IN.

Ajinkya Dighe, M.S. conferred February 2010. Currently at Godrej Industries Limited.

Chen-An (Roger) Tien, M.S. conferred September 2010. Currently at Delta Electronics, Taiwan

Nithin Ramadurai, M.S. conferred September 2010. Currently at Living Proof, Cambridge, MA

Ching-Wen (Ashley) Chang. M.S. conferred February 2011. Currently at APP Pharmaceuticals, Buffalo.

Pooja (Chakrabarty) Roy, M.S. conferred September 2011. Currently at Amgen, Los Angeles, CA

Gary Martin, M.S. conferred September, 2011. Currently at GEA PHE Systems, Pennsylvania

Digvijay Singh Chauhan, M.S. conferred February 2012. Currently at Unifrax, Niagara Falls, NY

Mark Kaus, M.S. conferred February 2012. Currently at Azota Ltd., Houston, TX

Krystal Lajoie, M.S. conferred February 2013. Currently at Surmet, Buffalo, NY

Gauri Dilip Patki, M.S. conferred February 2013.

Vikram Reddy Ardham, M.S. conferred June, 2013, Ph.D. student at ETH, Zurich

Parham Rohani, M.S. conferred September, 2013, Ph.D. student at UB

Di Qi, M.S. conferred June, 2014.

Changning Li, M.S. conferred June 2014.

Biju Mathew, M.Eng. conferred February 2005.

Chin Kok Ooi, M.Eng. conferred February 2005. Currently at Schlumberger, Denver, CO

Rachel Peck, M.Eng. conferred June 2005.

Jeffrey Pierce, M.Eng. conferred June 2005.

Kok On Soh, M.Eng. conferred September 2005.

Perry Pacouloute, M.Eng. conferred

Michelle Ford, M.Eng. conferred February 2014.

### **Current Graduate Students:**

Dewei Zhu, Ph.D. candidate, started September 2009.

Xianliang Wang, Ph.D. candidate, started September 2010.

Yue Li, Ph.D. candidate, started September 2010.

Qi Li, Ph.D. candidate, started September 2011.

Parham Rohani, Ph.D. candidate, started January 2012.

Liang Qiao, Ph.D. candidate, started September 2012.

Shailesh Konda, Ph.D. candidate, started September 2012.

Christopher Miller, Ph.D. candidate, started September 2013

Andrew Mowbray, part-time M.S. candidate, started September 2011.

Saurabh Singh, M.S. candidate, started September 2012.

Yujie Ke, M.S. candidate, started September 2013

Deqian Yin, M.S. candidate, started September 2013

Xiang Gao, M.Eng. candidate, started September 2013

Yong Joon Lee, M.Eng. candidate, started September 2013

Najing Li, M.Eng. candidate, started September 2013

Yang Liu, M.Eng. candidate, started September 2013

**Undergraduate researchers for academic credit or through summer programs:** Zachary Wong, Kevin Jock, Andrew Craft, Jaehoon Jeong, Mark Falinski, Christopher Spengler, Keira Henry, Christina Olgin, Steven Brown, Daniel Salem, Ashley Narain, Bianca Kirkland, Xinyu Wang, Jordan Angie, Paul Garman, David Ramsammy, Janet Oluwole, Jean Kang, Matthew Hill, Demetra McIlwain, Mohammed Attwa, Ben Afriye, Conor Kilcoyne, Belle Cunningham, Larry Lai, Will van Bramer, Chenxu “Tony” Liu, Kwadjo Asante, Phillip Tucciarone, Nicholas Karker, Michael Demissie, YingYing Kwak, YingHaw Lee, Fenna Wiyasa, Joseph Marchica, Thao Nguyen, Ui Tee Cheah, Jasmine May, Christopher Thomas, Fenna Wiyasa, Daniel DeMonte, Krystal LaJoie, Yudazyco (no surname), Elizabeth Egbetokun, David Galuski, Elizabeth Oluwabunmi, Nikita Petrosyan, Yan Lian Tay, Franklin Yeboah, Brittany Malone, Mary Brummond, Eburn Ayandele, Geraldene Agbasionwe, Carlos Gonzales, Lola Ojurongbe, Sie Siong Wong, Tomiko Stroud, Roshad Coston, Joyce Eleda, Mary Akuamoah-Boateng, Justin Lawliss, Michael Williams, Calvin Setiawan, Mame-efua Afrane, Paul Schneeberger, Mark Rudolph, Misty Pender, Kristen Lane, Folarin Erogbogbo, Brian Peer, Alireza Goodarzi, William Scharmach, Phan Nee Saw, Siew Shee Lim, Ashish Chitalia, Chin Fan Tee, Howard Tan, Siew Chen Mak, Jessica Yee, Christine Balonek, Jeff Pierce, Daniel Kim, Sarah Marshall, Chiemezie Amadi, Thomas Agbanyo, James Tseng, Elijah Kim, and Scott Comstock.

**Visiting Researchers:**

Yunjun Rui, Associate Professor, Nanjing University of Science and Technology

Lin Tao, Ph.D. student, Nanjing University

Sampa Chakrabarti, Associate Professor, University of Calcutta

Oscar Bomati-Miguel, researcher, University of Aragon (currently Universidad Autonoma de Madrid)

Anoop Gupta, Ph.D. student, University of Duisburg-Essen (currently at BASF)

Seiichi Sato, Assistant Professor, Hyogo University

Songbeom Kim, Ph.D. student, KAIST (currently at UNIST, Ulsan, Korea)

Adil Mukhtarov, Professor, Institute of Nuclear Physics, Tashkent, Uzbekistan

Polina Tereshchuk, Ph.D. student, Institute of Nuclear Physics, Tashkent, Uzbekistan (currently at University of Sao Paulo, Brazil)

Zakir Khakimov Professor, Institute of Nuclear Physics, Tashkent, Uzbekistan (deceased)

## FUNDED RESEARCH AND EDUCATION GRANTS

“MRI: Development of an Instrument for Quantitative Characterization of Behavior of Magnetic Particles and Magnetically-Labeled Biomaterials in Emerging Applications,” NSF, \$764,736 (70% from NSF, 30% UB cost-share), start date 09/01/13, duration 36 months, PI with 3 co-PIs, Swihart share ~25%.

“Bio-nanocombinatorics to Achieve Precisely-Assembled Multicomponent, Functional Hybrid Nanomaterials”, AFOSR, \$2,875,000, start date 05/01/2012, duration 60 months, co-PI with P.N. Prasad, M.R. Knecht, T. Walsh, and A. Zhang. Swihart share ~20%.

“Study of reaction mechanisms and mass transport phenomena in carbonyl decomposition”, Vale-INCO Canada, \$225,000 total costs, start date 12/12/2011, duration 36 months. Swihart share = 100%

“Development of Si(Ge) nanoparticles and nano ink for low cost PV application”, Korean Institute for Energy Research, \$93,018 total costs, start date 07/01/2011, duration 18 months. Swihart share = 100%

“Third-order Nonlinear Optical Organics”, AFOSR, \$1,297,656 total costs, start date 06/15/2011, duration 36 months, co-PI with P.N. Prasad, Tobin Marks, and John Reynolds. Swihart share, ~25%.

“GOALI: Flame-based Synthesis of Metal Nanoparticles at Millisecond Residence Times”, NSF, \$278,811 total costs, start date 03/01/2011, duration 36 months. Swihart share = 100%, co-PI Vassilis Papavassiliou from Praxair supported by Praxair cost-share commitment not included in above total costs.

“MRI: Acquisition of a Dual Beam/Focused Ion Beam System for Research and Education”, NSF, \$1,096,411 total costs, start date 08/01/09, duration 12 months, one of three co-PI's with PI Gottfried Strasser. Swihart share ~20%.

“Development of Bottom-Up Chemical Approaches to 3-D Negative Index Meta-Materials”, AFOSR, \$1,500,000 total costs, start date 04/01/09, duration 60 months, co-PI with PI Paras N. Prasad and co-PI Edward Furlani. Swihart share ~33%.

“Nanoparticle Synthesis using Thermal Nozzle Technology”, Praxair, Inc., \$50,000 total costs, start date 03/01/09, duration 9 months. Swihart share = 100%

“Synthesis and Production of Nanoparticles of Cesium Dihydrogen Phosphate”, SuperProtonic, Inc., \$20,852 total costs, start date 07/01/07, duration 3 months. Swihart share = 100%

“Nonconventional Tight-Binding Molecular Dynamics Simulations of Silicon Nanoparticles: Effect of Shape, Surface Termination, and Defects on Electronic Structure”, US co-PI with international co-PI Khakimov Zokirkhon Muydinkhonovich of the Institute of Nuclear Physics, Uzbekistan Academy of Sciences, Tashkent, Uzbekistan, funded by The Civilian Research and

Development Foundation, \$61,200 direct costs, primarily to support travel of the Uzbek team to UB, start date 06/01/07, duration 24 months. Swihart share = 20%

“Continuous Production of Semiconductor Nanoparticles by Spray Pyrolysis”, NSF, \$280,089 total costs, start date 03/15/07, duration 36 months. Swihart share = 100%

“Nanoparticle Synthesis using Thermal Nozzle Technology”, Praxair, Inc., \$69,951 total costs, start date 03/01/07, duration 12 months. Swihart share = 100%

“MRI: Acquisition of an Imaging Time of Flight Secondary Ion Mass Spectrometer (ToF-SIMS),” one of 4 co-PI’s with PI Joseph Gardella, NSF, \$905,195 total costs, start date 07/01/06, duration 24 months. Swihart share = 20%

“Third International Symposium on Gas-Phase and Surface Chemistry of Vapor Phase Materials Processing”, NSF, \$4,000, start date: 06/01/06, duration 12 months. Swihart share = 100%

“Porous Polymer Gratings for Sensing Applications”, co-PI with PI Alexander Cartwright, UB Foundation, Sterbutzel Research Fund, \$80,000 direct costs, start date 06/01/05, duration 24 months. Swihart share = 50%

“Biomedical assays based on zinc selenide and silicon luminescent quantum dots”, PI with co-PI’s Stelios Andreadis, T.J. Mountziaris, and Eli Ruckenstein, UB Foundation, Sterbutzel Research Fund, \$70,000 direct costs, start date 06/01/05, duration 24 months. Swihart share = 25%

“Collaborative Research: Detailed Chemical Kinetic Modeling of the Homogeneous Chemical Nucleation of Nanoparticles”, PI, funded by NSF, \$79,195 direct costs, \$120,000 total costs, start date 04/15/05, duration 36 months. Swihart share = 100% (collaborator funded by separate grant)

“MRI: Acquisition of small/wide angle X-ray scattering system for nanomaterials characterization”, one of 4 co-PI’s with PI Paschalis Alexandridis, \$332,090 direct costs, \$360,796 total costs, start date, 08/01/04, duration 24 months. Swihart share = 20%

“Experimental parametric study on the preparation of ultrafine (50 – 200 nm diameter) nickel particles by laser driven decomposition of nickel carbonyl”, PI, funded by INCO Technical Services, Ltd. (Toronto, Canada), \$13,456 direct costs, \$24,843 total costs, start date 12/01/03, duration 5 months. Swihart share = 100%

“Synthesis and Characterization of Tellurite Glass Nanoparticles and Nanocomposites for Photonics Applications”, PI, with co-PI James O’Reilly, funded by the UB IRCAF program, \$28,000 direct costs, start date 11/01/03, duration 12 months. Swihart share = 50%

“Advanced Nanoparticle Technologies for Novel Photodetectors and Emitters”, co-PI with PI Vladimir Mitin and co-PI’s Frank Bright and Alexander Cartwright, funded by the UB IRCAF program, \$40,000 direct costs, start date 11/01/03, duration 12 months. Swihart share = 25%

“Self-consistent tight-binding molecular dynamics simulation of hydrogenated silicon systems”, US co-PI with international co-PI Khakimov Zokirkhon Muydinkhonovich of the Institute of Nuclear Physics, Uzbekistan Academy of Sciences, Tashkent, Uzbekistan, funded by The

Civilian Research and Development Foundation, \$57,000 direct costs, primarily to support travel of the Uzbek team to UB, start date 11/18/03, duration 24 months. Swihart share = 20%

“REU Site: Transdisciplinary Undergraduate Research Initiative On Nanostructured Semiconductors (TURIONS)”, PI, with co-PI Alexander Cartwright; NSF, \$272,100 direct costs, \$306,000 total costs, start date 03/15/03, duration 36 months. MTS managed 100% of the funds, which supported undergraduate researchers working with 10 faculty.

“Synthesis and Characterization of Magnetic Nanoparticles and Assemblies Thereof”, PI, with co-PI’s Paras Prasad and Hong Luo, funded by UB IRCAF program, \$46,000 direct costs, start date 11/01/02, duration 12 months. Swihart share = 40%

“IGERT Biophotonics: Materials and Applications”, one of about 25 faculty participants, funded by NSF, \$2,685,476 total costs, start date 09/01, duration 60 months. Swihart share = 5%

“On-Line Measurement of Particles Generated in Polysilicon CVD Reactors”, PI, funded by Advanced Silicon Materials, Inc (Moses Lake, WA), \$64,139 direct costs, \$83,957 total costs, start date 05/01/01, duration 16 months. Swihart share = 100%

“Detailed Chemical Kinetic Modeling of the Homogeneous Chemical Nucleation of Nanoparticles”, PI with co-PI Linda Broadbelt of Northwestern University. NSF, \$319,825 direct costs, \$381,999 total costs, start date 11/15/00, duration 48 months. Swihart share = 50%

“Incorporation of Graphical Programming and Automated Data Acquisition into the Chemical Engineering Undergraduate Laboratories”, PI, funded by the University at Buffalo Educational Technology Grants Program, \$9,800 direct costs, start date 03/01/99, duration 15 months. Swihart share = 100%