

CURRICULUM VITAE (09/09): IAN IVAR SUNI

TITLE

Professor, Department of Chemical and Biomolecular Engineering
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EDUCATION

Ph.D. in chemistry (advisor William Klemperer), Harvard University, March, 1992.
B.S. in chemical engineering, The University of Michigan, April, 1983.

RESEARCH AND TEACHING EXPERIENCE

Professor, Dept. of Chemical and Biomolecular Engineering, Clarkson University, 2006-present.
Associate Professor, Dept. of Chemical and Biomolecular Engineering, Clarkson University, 1999-2006.
Assistant Professor, Dept. of Chemical Engineering, Clarkson University, 1993-1999.
Adjunct Professor, Dept. of Chemistry and Biomolecular Science, 1994-present.
Visiting Research Professor II, School of Chemical Engineering, Georgia Institute of Technology, 2000.
Postdoctoral research associate, Dept. of Chemical Engineering (advisor Edmund G. Seebauer), The University of Illinois, 1991-1993.

PUBLICATIONS IN PEER-REVIEWED JOURNALS

45. R. Singh and **I.I. Suni**, "Minimizing Non-specific Interactions in Protein Biosensors that Utilize Electrochemical Impedance Spectroscopy," submitted to *J. Electrochem. Soc.*
44. R. Singh, R.E. Baltus and **I.I. Suni**, "Nanopore Immunosensor for Peanut Protein Ara h 1," conditionally accepted for publication in *Sens. Actuators B*.
43. A. Tripathi, **I.I. Suni**, Y. Li, F. Doniat and J. McAndrew, "Cu Electrochemical Mechanical Planarization (ECMP) Surface Quality," *J. Electrochem. Soc.* **156**, H555 (2009).
42. Y. Huang, M. Bell and **I.I. Suni**, "Impedance Biosensor for Peanut Protein Ara h 1," *Anal. Chem.* **80**, 9157 (2008).
41. Y. Huang and **I.I. Suni**, "Degenerate Si as an Electrode Material for Electrochemical Biosensors," *J. Electrochem. Soc.* **155**, J350 (2008).
40. A. Tripathi, C. Burkhard, **I.I. Suni**, Y. Li, F. Doniat, A. Barajas and J. McAndrew, "Electrolyte Composition for Cu Electrochemical Mechanical Planarization (ECMP)," *J. Electrochem. Soc.*

- 155**, H918 (2008).
39. **I.I. Suni**, "Impedance Methods for Electrochemical Sensors Using Nanomaterials," *Trends Anal. Chem.* **27**, 604 (2008).
 38. S. Govindaswamy, A. Tripathi, **I.I. Suni** and Y. Li, "5-Pheny-1-H-Tetrazole as a Low-pH Passivating Agent for Copper Chemical Mechanical Planarization," *J. Electrochem. Soc.* **155**, H459 (2008).
 37. A. Tripathi, J. Wang, L.A. Luck and **I.I. Suni**, "Nanobiosensor Design Utilizing a Periplasmic *E. coli* Receptor Protein Immobilized within Au/Polycarbonate Nanopores," *Anal. Chem.* **79**, 1266 (2007).
 36. J. Wang, L.A. Luck and **I.I. Suni**, "Immobilization of the Glucose/galactose Receptor (GGR) Protein onto an Au Electrode through a Genetically Engineered Cysteine Residue," *Electrochem. Solid-State Lett.* **10**, J33 (2007).
 35. J. Wang, J.A. Profitt, M.J. Pugia and **I.I. Suni**, "Au Nanoparticle Conjugation for Impedance and Capacitance Signal Amplification in Biosensors," *Anal. Chem.* **78**, 1769 (2006).
 34. B. Du and **I.I. Suni**, "Electrochemical Dissolution of Ta and TaN Diffusion Barriers," *Electrochem. Solid-State Lett.* **8**, G283 (2005).
 33. B. Du and **I.I. Suni**, "Cu Planarization for ULSI Processing by Electrochemical Methods: A Review," *IEEE Trans. Semicond. Manuf.* **18**, 341 (2005).
 32. J. Wang, K.A. Carmon, L.A. Luck and **I.I. Suni**, "Electrochemical Impedance Biosensor for Glucose Detection Utilizing a Periplasmic *E. coli* Receptor Protein," *Electrochem. Solid-state Lett.* **8**, H61 (2005).
 31. S. Sapra, H. Li, Z. Wang and **I.I. Suni**, "Voltammetry and Impedance Studies of Ta in Aqueous HF," *J. Electrochem. Soc.* **152**, B193 (2005).
 30. B. Du and **I.I. Suni**, "Water Diffusion Coefficients During Copper Electropolishing," *J. Appl. Electrochem.* **34**, 1215 (2004).
 29. B. Du and **I.I. Suni**, "Mechanistic Studies of Copper Electropolishing in Phosphoric Acid Electrolytes," *J. Electrochem. Soc.* **151**, C375 (2004).
 28. Z. Wang, H. Li, H. H. Shodiev and **I.I. Suni**, "Immersion/electroless Deposition of Cu onto Ta," *Electrochem. Solid-State Lett.* **7**, C67 (2004).
 27. H. Lin, A.A. Busnaina and **I.I. Suni**, "Investigation of Ionic Contamination Removal from Silicon Dioxide Surfaces," *Surf. Engin.* **18**, 233 (2002).
 26. R. Srinivasan, Y. Tian and **I.I. Suni**, "Surface Plasmon Effects on Second Harmonic Generation during Au Nanoparticle Deposition onto Si(111)," *Surf. Sci.* **490**, 308 (2001).
 25. **I.I. Suni**, G.W. Gale and A.A. Busnaina, "Dissolution Kinetics for Atomic, Molecular and Ionic

- Contamination from Silicon Wafers during Aqueous Processing,” *J. Electrochem. Soc.* **146**, 3522 (1999).
24. C. Rossiter and **I.I. Suni**, “Atomic Force Microscopy Studies of Au Deposition from Aqueous HF onto Si(111),” *Surf. Sci.* **430**, L553 (1999).
 23. R. Srinivasan and **I.I. Suni**, “Kinetic Analysis of Au Deposition from Aqueous HF onto Si(111) by Surface Second Harmonic Generation,” *J. Electrochem. Soc.* **146**, 570 (1999).
 22. S.V. Babu, **I.I. Suni** and D.H. Rasmussen, “Development of a CD-ROM on Thin Film Technologies: Design, Usability Assessment and Challenges,” *J. Engin. Educat.* **Supplement**, 583 (1998).
 21. R. Srinivasan and **I.I. Suni**, “Differential Capacitance Studies of the Specific Adsorption of Thiosulfate on Ag,” *J. Appl. Electrochem.* **28**, 993 (1998).
 20. R. Srinivasan and **I.I. Suni**, “Electroless Deposition of Au onto Si(111) Studied by Surface Second Harmonic Generation,” *Surf. Sci.* **408**, L698 (1998).
 19. **I.I. Suni**, “Kinetic Limitations on Metal Dissolution during Aqueous Silicon Wafer Processing,” *Electrochem. Solid State Lett.* **1**, 94 (1998).
 18. D. Chopra and **I.I. Suni**, “An Optical Method for Monitoring Metal Contamination During Aqueous Processing of Silicon Wafers,” *J. Electrochem. Soc.* **145**, 1688 (1998).
 17. D. Chopra, **I.I. Suni** and A.A. Busnaina, “Cu Dissolution from Si(111) into an SC-1 Process Solution,” *J. Electrochem. Soc.* **145**, L60 (1998).
 16. D. Chopra and **I.I. Suni**, “*In situ* Measurements of Ultrathin Silicon Oxide Dissolution Rates,” *Thin Solid Films* **323**, 170 (1998).
 15. **I.I. Suni**, “Ellipsometric Thickness Measurements of Ultrathin Silicon Oxides Formed in Aqueous Solutions,” *Jap. J. Appl. Phys.* **2** **37**, L712 (1998).
 14. **I.I. Suni**, “*In situ* Optical Studies of Metal Deposition,” *J. Appl. Electrochem.* **27**, 1219 (1997).
 13. S.M. Ross and **I.I. Suni**, “Adaptive Computer Control in a Hypermedia Materials Science Document,” *J. Educ. Multimedia Hypermedia* **6**(3/4), 383 (1997).
 12. **I.I. Suni** and S.M. Ross, “Iterative Design and Usability Assessment of a Materials Science Hypermedia Document,” *J. Educ. Multimedia Hypermedia* **6**(2), 187 (1997).
 11. **I.I. Suni**, “Effect of Three-body Dispersion Interactions on the Surface Dynamics of Ar(111),” *Surf. Sci.* **391**, L1212 (1997).
 10. **I.I. Suni**, “Mass Transfer Surface Diffusion of Noble Gases,” *Thin Solid Films* **306**, 62 (1997).
 9. **I.I. Suni**, “The Mechanism of Surface Hetero-diffusion at Elevated Temperatures,” *Surf. Sci.* **349**, L179 (1996).

8. **I.I. Suni** and E.G. Seebauer, "Surface Self-diffusion at High Temperatures: New Simulation Insights," *Thin Solid Films* **272**, 229 (1996).
7. **I.I. Suni** and E.G. Seebauer, "A New Physical Picture for Surface Diffusion at High Temperatures," *Surf. Sci.* **301**, L235 (1994).
6. **I.I. Suni** and E.G. Seebauer, "Surface Diffusion of In on Ge(111) Studied by Optical Second Harmonic Microscopy," *J. Chem. Phys.* **100**, 6772 (1994).
5. K. A. Schultz, **I. I. Suni** and E. G. Seebauer, "Microscopy of Adsorbates by Surface Second Harmonic Generation," *J. Opt. Soc. Am. B* **10**, 546 (1993).
4. **I. I. Suni** and W. Klemperer, "Angular-radial Coupling in the Tunneling Motion of (HCCH)₂," *J. Chem. Phys.* **98**, 988 (1993).
3. K. A. Schultz, **I. I. Suni**, C. E. Allen and E. G. Seebauer, "Optical Second Harmonic Study of Sb Adsorption on Ge(111)," *Surf. Sci.* **276**, 40 (1992).
2. S. Lee, **I.I. Suni** and W. Klemperer, "The Rotational Spectrum, Internal Rotation, and Structure of H₂O-NCCN and D₂O-NCCN," *J. Chem. Phys.* **95**, 5577 (1992).
1. **I. I. Suni**, S. Lee and W. Klemperer, "Preliminary Structural Characterization of Complexes of Cyanogen: NH₃-NCCN and (NCCN)₂," *J. Phys. Chem.* **95**, 2859 (1991).

GRANTS AND CONTRACTS (Totaling over \$3.3 million)

27. Don H. Rasmussen and **I.I. Suni**, "Smart Responsive Nanocomposites for Soldier Protection: Thin Film II-VI Alloy Materials for Solar Energy Applications," U.S. Army W911NF-05-1-0339, \$165,009, 2009-2010.
26. **I.I. Suni**, "Process for Screening Chemical Additives for Ta/TaN Chemical Mechanical Planarization (CMP) Slurries," BASF Aktiengesellschaft, \$62,500, 2008-2009.
- 25a. C. Cetinkaya, W. Ding, F. Hua and **I.I. Suni**, "Research Experience for Teachers (RET): Nanotechnology Undergraduate Education (NUE): Overcoming the Geographic/Infrastructure Disadvantage of a Remote Small Research/Teaching Institution in Nano/micro-scale Engineering Education," National Science Foundation, EEC-0836640, \$20,000, 2008-2010.
25. C. Cetinkaya, W. Ding, F. Hua and **I.I. Suni**, "Nanotechnology Undergraduate Education (NUE): Overcoming the Geographic/Infrastructure Disadvantage of a Remote Small Research/Teaching Institution in Nano/micro-scale Engineering Education," National Science Foundation, EEC-0836640, \$200,000, 2008-2010.
- 24a. **I.I. Suni**, "Transdermal Drug Delivery System with Feedback Mechanism," New World Pharmaceuticals, \$25,000, 2009-2010.
24. **I.I. Suni**, S. Schuckers, E. Sazonov, C. Cetinkaya and W. Ding, "Transdermal Drug Delivery System with Feedback Mechanism," New World Pharmaceuticals, \$28,651, 2008-2009.
23. Y. Li, G. Ahmadi and **I.I. Suni**, "NYSTAR CAT Development Project, Air Liquide," \$93,808, 2007-2008.

22. **I.I. Suni**, "Limited Research Agreement," Cabot Microelectronics Corp., \$15,582, 2007.
21. Y. Li and **I.I. Suni**, "Optimization of Electrolytes for Copper ECMP," American Air Liquide, \$79,873, 2007-2008.
20. **I.I. Suni** and M.A. Twiss, "Smart Responsive Nanocomposites for Soldier Protection: Quartz Crystal Microbalance Studies of Food/Water Pathogens," U.S. Army W911NF-05-1-0339, \$85,494, 2006-2008.
19. **I.I. Suni** and D.H. Rasmussen, "Electrodeposited Coatings for Metallic SOFC Interconnects," Nanodynamics and NYSTAR, \$175,200, 2006-2008.
18. **I.I. Suni** and D. Roy, "Formulate an Electrolyte and Electrode Combination for a Low Cost Electrolyte Sensor," Spectron Sensors and NYSTAR, \$87,500, 2006.
17. Y. Li and **I.I. Suni**, "Investigation of ECMP Processes and Requirements," American Air Liquide, \$75,151, 2005-2006.
16. **I.I. Suni**, "Smart Responsive Nanocomposites for Soldier Protection: Electrochemical Impedance Biosensors for Food/Water Pathogens," U.S. Army W911NF-05-1-0339, \$79,229, 2005-2006.
15. **I.I. Suni**, "Impedance Testing of Solid Oxide Fuel Cells," Nanodynamics, \$65,280, 2005.
14. D.H. Rasmussen, B. Faber and **I.I. Suni**, "Nanotechnology Undergraduate Education (NUE): Introduction to Nanomaterials Science and Engineering," National Science Foundation, EEC-0407261, \$100,000, 2004-2007.
13. **I.I. Suni**, "Biosensing for Process Control," Center for Advanced Materials Processing (CAMP), Clarkson University, \$25,000, 2004-2005.
- 12a. **I.I. Suni** and L.A. Luck, "Research Experience for Teachers (RET): Sensors and Sensor Networks: Electrochemical Impedance Architecture for Biosensors," National Science Foundation, CTS-0329698, \$10,000, 2005.
12. **I.I. Suni** and L.A. Luck, "Sensors and Sensor Networks: Electrochemical Impedance Architecture for Biosensors," National Science Foundation, CTS-0329698, \$300,000, 2003-2007.
- 11a. **I.I. Suni** and I. Sokolov, "Research Experience for Undergraduates (REU): Nanoscale Exploratory Research (NER): A Novel Nanobiosensor Architecture," National Science Foundation, CCF-0304143, \$5000, 2005.
11. **I.I. Suni** and I. Sokolov, "Nanoscale Exploratory Research (NER): A Novel Nanobiosensor Architecture," National Science Foundation, CCF-0304143, \$100,000, 2003-2005.
- 10a. **I.I. Suni**, Reynolds Tech donation of an electroplating tool assessed at \$90,000, 2002.
10. **I.I. Suni**, "Electroplating onto Semiconductor Materials," Reynolds Tech, \$61,488, 2001-2003.
- 9a. **I.I. Suni**, "Research Experience for Teachers (RET): Optical Property/structure/process Relationship for Gold Nanoparticles," National Science Foundation, CTS-0094773, \$10,000, 2003.
9. **I.I. Suni**, "Optical Property/structure/process Relationship for Gold Nanoparticles," National Science Foundation, CTS-0094773, \$214,714, 2001-2004.

8. **I.I. Suni**, "Copper Electropolishing for Damascene Planarization," Center for Advanced Materials Processing (CAMP), Clarkson University, \$72,000, 2001-2004.
7. A. Busnaina and **I.I. Suni**, "A Study of the Effect of Acoustic Streaming on the Copper Electroplating Process," Reynolds Tech, \$107,147, 1999-2001.
- 6b. **I.I. Suni**, S.V. Babu, D.H. Rasmussen and J. Fendler, "Research Experiences for Teachers (RET): Development and Assessment of Hypermedia-based Instruction in Colloidal Technology," National Science Foundation, \$20,000, 2002.
- 6a. **I.I. Suni**, S.V. Babu, D.H. Rasmussen and J. Fendler, "Research Experiences for Undergraduates (REU): Development and Assessment of Hypermedia-based Instruction in Colloidal Technology," National Science Foundation, \$10,000, 2000-2001.
6. **I.I. Suni**, S.V. Babu, D.H. Rasmussen, J. Fendler and R. Mackay, "Development and Assessment of Hypermedia-based Instruction in Colloidal technology," National Science Foundation, EEC-9872463, \$249,748, 1999-2002.
5. S.V. Babu and **I.I. Suni**, "Nickel Plating," New York State Science and Technology Foundation, \$3000, 1999.
4. S.V. Babu, R. MacKay, A.A. Busnaina, Y. Li and **I.I. Suni**, "Acquisition of Instrumentation for a Thin Film Characterization Facility," National Science Foundation, CTS-9871264, \$158,655, 1998-1999
- 3a. **I.I. Suni** and A.A. Busnaina, "Research Experiences for Undergraduates (REU): A New Technique for Monitoring Metallic Contamination during Aqueous Semiconductor Wafer Processing." National Science Foundation, \$10,000, 1998-1999.
3. **I.I. Suni** and A.A. Busnaina, "A New Technique for Monitoring Metallic Contamination during Aqueous Semiconductor Wafer Processing." National Science Foundation, ECS-9634058, \$188,103, 1997-2000.
- 2a. **I.I. Suni**, "Research Experiences for Undergraduates (REU): Monte Carlo Simulations of the Surface Diffusion of Noble Metals," National Science Foundation, \$10,000, 1996-1997.
2. **I.I. Suni**, "Experimental Studies of Surface Transport Aspects of Electrodeposition and Corrosion," National Science Foundation, CTS-9527497, \$187,339, 1996-1999.
- 1a. S.V. Babu, D.H. Rasmussen, and **I.I. Suni**, "Research Experiences for Undergraduates (REU): Thin Film Technologies: Combined Research-curriculum Development," National Science Foundation, \$30,000, 1995-1996.
1. S.V. Babu, D.H. Rasmussen and **I.I. Suni**, "Thin Film Technologies: Combined Research-curriculum Development," National Science Foundation, EEC-9420571, \$400,000, 1994-1997.

PEER-REVIEWED CONFERENCE PROCEEDINGS

6. **I.I. Suni**, "Electrochemistry of Ta in Aqueous HF," in *Electrochemical Processing in ULSI and MEMS II*," The Electrochemical Society, ECS Transactions **2**(6), p. 439 (2006).
5. B. Du and **I.I. Suni**, "Copper Electropolishing and its Application to ULSI Copper Planarization," in *Electrochemical Processing in ULSI and MEMS*," The Electrochemical Society, ECS Proceedings **2004-17**, p. 297 (2004).

4. **I.I. Suni**, H. Lin, and A.A. Busnaina, "Effects of Pulsating Flow on Claning of and Deposition into Trenches," in *Fundamental Gas-phase and Surface Chemistry of Vapor Deposition II/Process Control, Diagnostics and Modeling in Semiconductor Manufacturing IV*, The Electrochemical Society, ECS Proceedings **2001-13**, p. 332 (2001).
3. **I.I. Suni**, Y. Tian and A.A. Busnaina, "Surface Roughness Evolution during Cu Electropolishing," in *Scanning Probe Microscopy for Electrode Characterization and Nanometer Scale Modification* (The Electrochemical Society, ECS Proceedings **2000-35**, p. 194, 2000).
2. **I.I. Suni**, A.A. Busnaina, C.S. Tiwari, H. Lin, V. Reynolds and C. Neely, "Copper Electroplating onto Silicon Wafers using High-frequency Acoustic Streaming," in *Copper Interconnects, New Contact Metallurgies, and Low-k Interlevel Dielectrics* (The Electrochemical Society, ECS Proceedings **2000-27**, p. 15-22, 2000).
1. **I.I. Suni** and E.G. Seebauer, "Surface Diffusion of In and Sb on Ge(111) Studied by Optical Second Harmonic Microscopy," in fall 1993 *Materials Research Society Symposia Proceedings*, Vol. **317**, entitled *Mechanisms of Thin Film Evolution*, p. 21.

INVITED PRESENTATIONS

27. **I.I. Suni**, "Electrochemical Biosensors Utilizing Impedance Methods," Department of Chemistry and Biochemistry, Texas State University, March 26, 2009.
26. **I.I. Suni**, "Electrochemical Biosensors," School of Computer, Mathematical and Natural Sciences, Morgan State University, March 5, 2009.
25. **I.I. Suni**, "Electrochemical Biosensors Utilizing Impedance Methods," National Institute of Standards and Technology (NIST), Gaithersburg, MD, October 3, 2008.
24. **I.I. Suni**, "Biosensors using Electrochemical Impedance Spectroscopy," School of Chemical Engineering and Bioengineering, Washington State University, March 7, 2008.
23. **I.I. Suni**, "Biosensors using Electrochemical Impedance Spectroscopy," Department of Chemistry at Southern Methodist University, February 15, 2008.
22. **I.I. Suni**, "Biosensors using Electrochemical Impedance Spectroscopy," Department of Chemistry at Missouri State University, February 4, 2008.
21. **I.I. Suni**, "Biosensors using Nanomaterials and Electrochemical Impedance Spectroscopy," Department of Chemistry at the University of Binghamton, November 16, 2007.
20. **I.I. Suni**, "Nanomaterials for Electrochemical Impedance Biosensors," Department of Chemical Engineering seminar at Villanova University, April 10, 2007.
19. **I.I. Suni**, "Nanomaterials for Electrochemical Impedance Biosensors," College of Engineering seminar at the University of Texas Arlington, March 8, 2007.
18. **I.I. Suni**, "Nanomaterials for Electrochemical Impedance Biosensors," Nanoscale Science seminar at the University of North Carolina Charlotte, March 1, 2007.

17. **I.I. Suni** and B. Du, "Electrochemistry of Ta in Aqueous HF," Spring 2006 Meeting of the Electrochemical Society, Denver, CO.
16. **I.I. Suni**, "Electrochemical Impedance Biosensors," Department of Chemical Engineering seminar, Columbia University, January 24, 2006.
15. **I.I. Suni**, "Electrochemistry and Electrochemical Engineering: Applications to Biosensors, Thin Film Growth and Dissolution, and Nanotechnology," College of Nanoscale Science and Engineering seminar, University of Albany, April 1, 2005.
14. **I.I. Suni**, "Copper Planarization by Electropolishing," Department of Chemical Engineering seminar, University of Rochester, November 3, 2004.
13. **I.I. Suni**, "Copper Planarization by Electropolishing," Department of Chemical and Biological Engineering seminar, University of Buffalo, September 22, 2004.
12. **I.I. Suni** and B. Du, "Cu Electropolishing for Damascene Processing," Spring 2004 Meeting of the Electrochemical Society, San Antonio, TX.
11. **I.I. Suni**, Gold Nanoparticle Deposition and Growth on Si(111) from Aqueous HF," Chemistry Department seminar, University of Alabama, Huntsville, January 2003.
10. **I.I. Suni**, Gold Nanoparticle Deposition and Growth on Si(111) from Aqueous HF," Department of Chemical and Environmental Engineering seminar, University of California, Riverside, April 2002.
9. **I.I. Suni**, "Electrochemical Nanotechnology," seminar at University of Electronic Science and Technology, Chengdu, P.R. China, March 19, 2002.
8. **I.I. Suni**, "Au Nanoparticle Nucleation and Growth on Si(111)," spring 2001 Electrochemical Society meeting, Washington, DC.
7. **I.I. Suni**, "Electrochemical. Au deposition onto Si(111) Studied By Nonlinear Optical Spectroscopy and Scanning Probe Microscopy," Department of Chemical Engineering seminar, Stanford University, February 1, 2000.
6. **I.I. Suni**, "Electrochemical. Au deposition Onto Si(111) Studied By Nonlinear Optical Spectroscopy and Scanning Probe Microscopy," Department of Chemical Engineering seminar, University of California at Berkeley, January 31, 2000.
5. **I.I. Suni**, "Kinetics of Au Nanoparticle Nucleation and Growth on Si(111)," Department of Chemical Engineering seminar, The University of Michigan, October 22, 1998.
4. **I.I. Suni**, "Kinetics of Au Nanoparticle Nucleation and Growth on Si(111)," School of Chemical Engineering seminar, Cornell University, September 28, 1998.
3. **I.I. Suni** and R. Srinivasan, "Studies of electroless Au deposition onto Si(111) using SHG, RBS and AFM," short talk at Gordon Research Conference on Electrodeposition in New London, NH, August 1998.

2. S.V. Babu, **I.I. Suni** and D.H. Rasmussen, "Development of Multimedia Course Modules on Thin Film Technologies: Challenges and Assessment," ICEE meeting, Chicago, August 1997 (Included in conference proceedings)
1. **I.I. Suni**, S.M. Ross, D.H. Rasmussen and S.V. Babu, "Development of a CD-ROM on Thin Film Technologies: Design Challenges and Assessment," NSF panel, 1996 ASEE annual conference and exposition in Washington, DC. (Included in conference proceedings)

BOOK CHAPTERS

1. **I.I. Suni**, "Benefits in Energy Budget," pp. 147-176, in *Nanotechnology. Volume 2: Environmental Aspects*, Editor Harald K. Krug. Wiley-VCH, Weinheim, 2008.

CONFERENCE PRESENTATIONS

53. **I.I. Suni**, "Ta Electrochemistry in Aqueous HF," 2009 AIChE Annual Meeting, Nashville, TN.
52. **I.I. Suni**, R. Singh and R.E. Baltus, "Anomalous Slow Diffusion in Protein-coated Nanopores," 2009 AIChE Annual Meeting, Nashville, TN.
51. **I.I. Suni**, A. Tripathi, J. Wang and L.A. Luck, "Impedance Biosensor Utilizing Receptor Proteins Immobilized within Au/polycarbonate Nanopores," Spring 2007 Meeting of the Electrochemical Society, Chicago, IL.
50. **I.I. Suni**, A. Tripathi, C. Burkhard, Y. Li, A. Barajas, F. Doniat and J. McAndrew, "Fundamental Studies of Cu ECMP Electrolytes," Spring 2007 Meeting of the Electrochemical Society, Chicago, IL.
49. **I.I. Suni**, J. Wang and L.A. Luck, "Impedance Biosensors through Direct Protein Immobilization Onto Au," 2006 AIChE Annual Meeting, San Francisco, CA.
48. **I.I. Suni** and B. Du, "Electrochemistry of Active Metals in Aqueous HF," 2006 AIChE Annual Meeting, San Francisco, CA.
47. **I.I. Suni**, J. Wang and L.A. Luck, "Electrochemical Impedance Methods for Biosensors," Spring 2006 Meeting of the Electrochemical Society, Denver, CO.
46. **I.I. Suni**, J. Wang and L.A. Luck, "Electrochemical Impedance Biosensors," 2005 AIChE Annual Meeting, Cincinnati, OH.
45. **I.I. Suni**, "Electrochemical Impedance Biosensors," 2005 China/USA/Japan Joint Chemical Engineering Conference, Beijing, P.R. China.
44. L.A. Luck, R.E. Baltus, **I.I. Suni**, J. Wang, K.S. Carmon and D.C. Bogdan, "Electrochemical Biosensors using Genetically Engineered Proteins as Biomaterials to Sense Small Molecules," 19th Symposium of the Protein Society, 2005, Boston, MA
43. **I.I. Suni** and B. Du, "Copper Planarization by Electropolishing, 2004 AIChE Annual Meeting, Austin, TX.

42. **I.I. Suni**, J. Wang and L.A. Luck, "Impedance Methods in Biosensing," 2004 AIChE Annual Meeting, Austin, TX.
41. **I.I. Suni** and H. Li, "Electrochemical Studies of the Ta/HF Interface," Spring 2004 Meeting of the Electrochemical Society, San Antonio, TX.
40. **I.I. Suni** and S. Sapra, "Control of Nucleation during Electrodeposition of Metal Nanoparticles," 2003 AIChE Annual Meeting, San Francisco, CA.
39. **I.I. Suni** and B. Du, "Copper Planarization by Electropolishing," 2003 AIChE Annual Meeting, San Francisco, CA.
38. **I.I. Suni**, L. Luck and H. Li, "Electrochemical Impedance Spectroscopy (EIS) for Biosensing," 2003 AIChE Annual Meeting, San Francisco, CA.
37. **I.I. Suni** and B. Du, "Copper Planarization by Electropolishing," 2002 AIChE Annual Meeting, Indianapolis, IN.
36. **I.I. Suni**, D. Rasmussen, D. Devashish and M.K. Chopra, "Hypermedia Software on Advanced Topics in Colloidal Technologies," 2002 ASEE Annual Meeting, Montreal, Quebec, Canada.
35. **I.I. Suni**, C.E. White, C.L. Henderson, P.A. Kohl, S.A. Bidstrup-Allen, R. Bondi and H. Reed, "Microscale Separation using Microfluidic On-chip Field-flow Fractionation: Theory and Experiment," 2001 AIChE Annual Meeting, Reno, NV.
34. **I.I. Suni**, C.S. Tiwari, A.A. Busnaina, V. Reynolds and C. Neely, "Additive-free Copper Electroplating onto Silicon Wafers using MHz Sonication," 2001 AESF annual technical conference, Nashville, TN.
33. **I.I. Suni**, M.K. Pusarlu, D.H. Rasmussen and S.M. Ross, "Hypermedia Software on Colloid-related Technology," 2001 ASEE Annual Meeting, Albuquerque, NM.
32. **I.I. Suni**, H. Lin and A.A. Busnaina, "Effects of Pulsating Flow on Cleaning of and Deposition into Trenches," spring 2001 Electrochemical Society meeting, Washington, DC.
31. **I.I. Suni**, A.A. Busnaina, C.S. Tiwari, V. Reynolds, M. Nakowski, C. Neely and T. Way, "Copper Electroplating onto Silicon Wafers using High-frequency Acoustic Streaming," 2000 AIChE annual meeting, Los Angeles, CA.
30. **I.I. Suni** and Y. Tian, "Planarization of Copper during Electrodissolution," 2000 AIChE annual meeting, Los Angeles, CA.
29. **I.I. Suni** and M.K. Pusarlu, "Hypermedia Software for Colloid-related Technology," 2000 AIChE annual meeting, Los Angeles, CA.
28. **I.I. Suni**, A.A. Busnaina, C.S. Tiwari, H. Lin, V. Reynolds and C. Neely, "Copper Electroplating onto Silicon Wafers using High-frequency Acoustic Streaming," fall 2000 Electrochemical Society meeting, Phoenix, AZ.

27. **I.I. Suni**, Y. Tian and A.A. Busnaina, "Surface Roughness Evolution during Cu Electropolishing," fall 2000 Electrochemical Society meeting, Phoenix, AZ.
26. A.A. Busnaina, C.S. Tiwari, **I.I. Suni**, V. Reynolds, M. Nakowski, C. Neely and T. Way, "Enhanced Copper Electroplating using High Frequency Acoustic Streaming," 2000 AESF annual technical conference, Chicago, IL.
25. **I.I. Suni** and A. Chan, "Hypermedia Software on Colloidal Technology," 2000 ASEE annual conference and exposition in St. Louis, MO.
24. **I.I. Suni**, H. Lin and A.A. Busnaina, "Dissolution of Contaminants into Semiconductor Aqueous Process Solutions," 1999 AIChE annual meeting, Dallas, TX.
23. **I.I. Suni**, A. Chan, S.V. Babu, D.H. Rasmussen, R. MacKay and J.H. Fendler, "Hypermedia Software on Colloidal Aspects of Materials Processing," 1999 AIChE annual meeting, Dallas, TX.
22. R. Srinivasan and **I.I. Suni**, "Kinetics of Metal Cluster Deposition," 1999 AIChE annual meeting, Dallas, TX.
21. R. Srinivasan and **I.I. Suni**, "Deposition of Au from Aqueous HF onto Si(111)," 1999 meeting of The Electrochemical Society in Seattle, WA.
20. **I.I. Suni**, H. Lin and A. Busnaina, "Dissolution of Metal Contaminants into Semiconductor Aqueous Process Solutions," 1999 meeting of The Electrochemical Society in Seattle, WA.
19. **I.I. Suni**, S.V. Babu and D.H. Rasmussen, "Development of Hypermedia Software on Thin Film and Colloidal Technologies," 1999 ASEE annual conference and exposition in Charlotte, NC.
18. R. Srinivasan and **I.I. Suni**, "Electroless Deposition of Au onto H-Si(111)," 1998 AVS International Symposium in Baltimore, MD.
17. **I.I. Suni**, D. Chopra and A.A. Busnaina, "Dissolution of Cu and Au into Aqueous Semiconductor Processing Solutions," 1998 AVS International Symposium in Baltimore, MD.
16. **I.I. Suni** and R. Srinivasan, "Electroless Deposition of Au from Aqueous HF onto Si(111)," 1998 AIChE annual meeting in Miami Beach, FA.
15. **I.I. Suni**, D. Chopra and A.A. Busnaina, "Dissolution of Cu and Au into Semiconductor Aqueous Processing Solutions," 1998 AIChE annual meeting in Miami Beach, FA.
14. S.V. Babu, **I.I. Suni** and D.H. Rasmussen, "Hypermedia Software on Thin Film Growth," 1998 AIChE annual meeting in Miami Beach, FA.
13. A.A. Busnaina and **I.I. Suni**, "Effective Non-contact Post-CMP Cleaning," Symposium on Contamination-free Manufacturing for Semiconductor Processing, Semicon West 98 in San Francisco, CA.
12. R. Srinivasan and **I.I. Suni**, "Electroless Deposition of Au onto Si(111) by Studied by Surface Second Harmonic Generation," 1998 CAMP annual technical meeting in Lake Placid, NY.

11. **I.I. Suni** and R. Srinivasan, "Electroless Noble Metal Deposition onto and Dissolution from Si(111)," 1998 ACS spring meeting in Dallas, TX.
10. **I.I. Suni** and R. Srinivasan, "Measurement of the Adsorption Strength at the Solid-liquid Interface," 1997 AIChE annual meeting in Los Angeles, CA.
9. **I.I. Suni** and D. Chopra, "Kinetics of Copper Dissolution in Aqueous Cleaning Solutions," 1997 AIChE annual meeting in Los Angeles, CA.
8. **I.I. Suni**, "Effects of Three-body Dispersion Interactions on Surface Transport," 1997 AIChE annual meeting in Los Angeles, CA.
7. **I.I. Suni**, S.V. Babu and D.H. Rasmussen, "Development of Multimedia Software on Thin Film Growth," fall 1996 Associated Colleges Teaching Effectiveness conference.
6. **I.I. Suni**, "Computer Simulations of Thin Film Growth," 1995 ASEE annual conference and exposition in Anaheim, CA.
5. **I.I. Suni**, "*In situ* Optical Techniques for Studying Metal Deposition Processes," 1995 AIChE annual meeting in Miami Beach, FA.
4. S.V. Babu, D.H. Rasmussen and **I.I. Suni**, "CD-ROM project on Thin Film Technologies: Progress Report," NSF panel, 1995 ASEE annual conference and exposition in Los Angeles, CA (Invited).
3. R. Srinivasan and **I.I. Suni**, "Second Harmonic Microscopy to Measure Diffusion during Electrodeposition," 1995 CAMP annual technical meeting in Lake Placid, NY.
2. **I.I. Suni** and E.G. Seebauer, "Surface Diffusion of In and Sb on Ge(111) Studied by Optical Second Harmonic Microscopy," fall 1993 MRS symposia in Boston, MA.
1. **I.I. Suni**, S. Lee and W. Klemperer, "Microwave Spectroscopy and Structure of van der Waals Complexes of Cyanogen," 1991 Molecular Spectroscopy symposium in Columbus, OH.

PATENTS

I.I. Suni, Y. Huang and S.A. Schuckers, "Bioelectronic Tongue for Food Allergen Detection," US patent application.

F.A. Sexton, **I.I. Suni**, C. Cetinkaya, S. Schuckers and E. Sazonov, "Integrated intra-dermal delivery, diagnostic and communication system," US patent application number 20090187167.

F. Doniat, M.L. Fisher, A.D. Zdunek, A.A. Barajas, **I.I. Suni**, X. Chu, A. Tripathi, and Y. Li, "Electrolyte Composition for Electrochemical Mechanical Planarization," US patent application number 20080142375.

Numerous Provisional Patents

HONORS AND AWARDS

John W. Graham Jr. Faculty Research Award, Clarkson University, 1999.

Professor of the Year Award, 1996, from Delta Chapter, Omega Chi Epsilon, Clarkson University.

PROFESSIONAL SERVICE AND ACTIVITIES

Symposia

Co-chair, "Solution-phase Synthesis of Electronic and Photonic Materials," 2009 AIChE annual meeting in Nashville, TN.

Co-chair, "Teaching Nanotechnology and Microelectronics," 2003 AIChE annual meeting in San Francisco, CA.

Co-chair, "Fifth International Symposium on Chemical Mechanical Polishing (CMP)," spring 2002 ECS meeting in Philadelphia, PA.

Co-chair, "Transport at Interfaces," 1996 AIChE annual meeting in Chicago, IL.

Co-chair, "Interfacial Phenomena in Materials Processing," 1995 AIChE annual meeting in Miami Beach, FA.

Editorial

S. Seal, R.L. Opila, C. Reidsema Simpson, K. Sundaram, H. Huff and **I.I. Suni**, eds., *Chemical Mechanical Planarization V* (The Electrochemical Society, ECS Proceedings 2002-1, 2002).

Memberships

American Institute of Chemical Engineers
The Electrochemical Society
American Society for Engineering Education
American Chemical Society

Reviews

Numerous proposal reviews for the National Science Foundation.

Numerous manuscript reviews for the *Journal of the Electrochemical Society*, *Electrochemical and Solid State Letters*, *Electrochimica Acta*, *Journal of Applied Electrochemistry*, *Analytical Chemistry*, *Langmuir*, etc.

RESEARCH DIRECTED

Ph.D. Theses

Aarti Krishna Krishnamurthy, "Electrochemical Methods for Si Thin Film Deposition," in process.

Abhinav Tripathi, "Electrolytes for Electrochemical Mechanical Planarization (ECMP) of Cu," 2008. **Now employed by Intel Corp.**

Jianbin Wang, "Electrochemical Impedance Biosensors," 2006. **Now employed by Vyteris Corp. in Fairlawn, NJ.**

Bing Du, "Copper Electropolishing for Global Planarization," 2004. **Now employed by FujiFilm Electronic Materials in Queen Creek, AZ.**

Y. Tian, "Cu planarization during Electrodeposition and AFM and Optical Characterization of Au Deposition onto p-Si(111)," 2000. **Employed for about 8 years by Applied Materials in San Jose, CA.**

Ramanathan Srinivasan, "Semiconductor and Noble Metal Surface Process Characterization using Electrochemical and Optical Techniques," 1998. **Now an Assistant Professor at IIT Madras.**

M.S. Theses

Laila Banu, "Electrodeposition of CIGS solar absorber materials," in process.

Rajdeep Singh, "Detection of Peanut Protein Ara h1 by Electrochemical Impedance Spectroscopy (EIS): Non-specific Interactions," 2009.

Abhinav Tripathi, "Biosensors Utilizing Au Nanotubes and Au Nanowires," 2006. **Now employed by Intel Corp.**

Ganesh Jayaraman. "Multimedia Software on Nanomaterials," 2006. **Now in the software industry.**

Sanjeev Sapra, "Pulse Reverse Electrodeposition of Noble Metals onto Si Wafers," 2004. **Now employed by Micron Technology in Boise, ID.**

Wang Zhoucheng, "Study of Copper Electroless/electrochemical Deposition onto Ta and Ta/Si wafers," 2003. **Now a PhD student with Phil Hopke, Department of Chemical and Biomolecular Engineering, Clarkson University.**

Madhu Kumar Pusalru, "Leveling Phenomena during Cu Electrodeposition," 2001. **Now in the software industry.**

Chandrasekhar Tiwari, "Additive-free Copper Electroplating for Chip Interconnects," 2001. **Now employed by Micron Technology in Boise, ID.**

Dinesh Chopra, "Electroless Studies of Copper Deposition and Dissolution during Wet Cleaning of Silicon Wafers," 1997. **Now employed by Micron Technology in Boise, ID.**

Ramanathan Srinivasan, "Preliminary Experiments for the Measurement of Surface Diffusivity in Electrochemical Systems," 1995. **Now an Assistant Professor at the Indian Institute of Technology (IIT) in Madras.**

Undergraduate

Clifford Rossiter (**PhD in Medicinal Chemistry from the University of Buffalo, now an**

Assistant Professor of Chemistry at SUNY Potsdam in Potsdam, NY)

Chuck McCarthy

Michael Sima

Craig Burkhard (**PhD in Interdisciplinary Engineering Science from Clarkson University**)

Stephen Schilling (**PhD in Toxicology from Duke University**)

Geoffrey Harding

Huda Jerri (**PhD student in Chemical Engineering at Pennsylvania State University**)
(**Under-represented group**)

Cindy Lee (**Under-represented group**)

Huong Tranh (**Under-represented group**)

J.J. Zhang

Sara Chase (**Under-represented group**)

Sharlita Hayden (**Under-represented group**)

Matthew Ingraham (**MS student in Mechanical Engineering at Clarkson University**)

Rebekah Squires (**Under-represented group**)

Melissa Bell (**Under-represented group**)

Joshua Aaron Gomberg

Matthew Souva

Nancy Sloat (**Under-represented group**)

Joy Lao (**Under-represented group**)

Kelsie Timbie (**Under-represented group**)

Multimedia Development

Andy Chan

Kathleen Tillstra

Erik DeValk

Bryce Corsner

Sudha Patibhandla

Zhao Chen

Xiaohong Tian

Devashish

Mukesh Chopra

Ganesh Jayaraman

COURSES TAUGHT

CH 345:	Chemical Reactor Analysis
CH 434/ES 534:	Air Pollution Control
CH 441/541:	Surface Reactivity: Applications to Microelectronics and Catalysis
CH 310/410:	Chemical Engineering Laboratory
CH 465:	Biochemical Engineering
ES 260:	Materials Science and Engineering I
ES 357/557:	Microelectronic Circuit Fabrication
ES 405/505:	Design of Experiments
ES 464/564	Corrosion Engineering
ME 591:	Nano/Micro-Scale Systems Engineering

DEPARTMENT SERVICE

Faculty advisor for ChemE car competition, 2006-2008.
Faculty advisor to student AIChE chapter, 2001-present.
Faculty advisor to Omega Chi Epsilon, 1993-2000.
Undergraduate Curriculum and Awards Committee, 1997-2000
Graduate Committee, 2001-2004, 2008-present.
Safety Committee member, 1993-1999.
Maintenance of graduate and faculty computer rooms, 1995-1996.
Coordinated departmental recruiting videotape, 1995.

UNIVERSITY SERVICE

Clarkson University Promotions Committee, 2008-present.
Clarkson University Faculty Senate, 2008-present.
Biomedical and Rehabilitation Engineering and Science Curriculum Committee, 2005-present.
Leading team to propose PhD program in Materials Science and Engineering, 2004-present.
Research Compliance Officer Search Committee, 2005.
Director of Bio/Rehabilitation Engineering Search Committee, 2003-2004.
University Teaching Excellence Committee, 2001-2004.
 T.A. Training Subcommittee, 1999-2000.
SOE Assessment Committee, 1998-2001.
Numerous Master's committees.
Numerous PhD proposal committees.
Numerous PhD defense committees.