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| Sang M Han, PhD | Chemical Engineering ⎜ Material Science & Engineering ⎜Surface Science |
| Electronic Materials & Devices ⎜ Advanced Mechanics ⎜ Photonics |

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**EDUCATION University of California - Santa Barbara**

Ph.D. Chemical Engineering, 1993 – 1998

**University of California - Berkeley**

B.S. Chemical Engineering with Honors, 1988 – 1992

**PROFESSIONAL EXPERIENCE**

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| 12/15 – present | ***Regents Professor*; University of New Mexico, NM**  Honorary title bestowed by the UNM Regents for research and teaching excellence. |
| 10/16 – present | ***Chief Technical Officer of* Osazda Energy and Osazda Materials, Albuquerque, NM**  Direct product/process development for Osazda on crack-tolerant metal matrix composites for thin-film solar cells, building/structural coatings for radiative cooling, and efficient light-trapping schemes for thin silicon solar cells. |
| 8/15 – 10/16 | ***Member of* Science and Technology Corporation (STC) Board of Directors; University of New Mexico, NM**  Participated portfolio management, technology transfer, finance, and investment for STC. |
| 8/14 – present | ***Director* of NanoScience and MicroSystems Engineering (NSME); University of New Mexico, NM**  Manage the NSME graduate program for curriculum improvement, enrollment increase, raising fellowships, recruiting, admissions, exam administration, and graduation. |
| 8/14 – present | ***Associate Chair* of Chemical & Biological Engineering (CBE) Department; University of New Mexico, NM**  Serve the CBE Department for undergraduate program accreditation and improvement as well as graduate program enhancement. |
| 7/12 – present | ***Professor;* Department of Chemical & Biological Engineering and Electrical & Computer Engineering; University of New Mexico, NM:**  Maintain and advance a research program with emphasis on semiconductor materials science and engineering, device fabrication, and technological applications. Current research topics encompass (1) print-and-press quantum structure formation in compound semiconductor films by patterned stress field; (2) heteroepitaxial films on silicon for photovoltaic, electronic, and sensor applications; (3) crack-tolerant metal matrix composites as durable metal contacts on thin-film solar cells; (4) microsphere-based manufacturable coatings for radiative cooling; and (5) thin film processing and nanoscale surface corrugation for enhanced light trapping in photovoltaic devices. |
| 1/10 – 6/12 | ***Associate Professor;* Department of Electrical and Computer Engineering;**  **University of New Mexico, NM** |
| 7/06 – 6/12 | ***Associate Professor;* Department of Chemical and Nuclear Engineering;**  **University of New Mexico, NM** |
| 4/00 – 6/06 | ***Assistant Professor*; Department of Chemical and Nuclear Engineering;**  **University of New Mexico, NM** |
| 11/99 – 4/00 | ***Post-doctoral Researcher* with Dr. Neil Benjamin;**  **Lam Research Corporation, Fremont, CA:** Engineered prototype hardware to facilitate low-pressure plasma ignition in electronegative discharges. Designed and characterized capacitive divider probes to measure high-frequency plasma potential variations in real time. |
| 11/98 – 10/99 | ***Post-doctoral Researcher* with Dr. Roya Maboudian;**  **Department of Chemical Engineering; U. C. Berkeley, CA:**  Conducted surface passivation studies on Ge for MEMS applications using a variety of ultra-high vacuum (UHV) diagnostics, such as X-ray photoelectron spectroscopy (XPS), high-resolution electron energy loss spectroscopy (HREELS), Auger electron spectroscopy (AES), low energy electron diffraction (LEED), and temperature programmed desorption (TPD). |
| 9/93 – 10/98 | ***Graduate Research Assistant* with Professor Eray Aydil;**  **Department of Chemical Engineering, U.C. Santa Barbara, CA:**  Investigated gas phase and surface chemistry during plasma enhanced chemical vapor deposition (PECVD) of SiO2 and fluorinated SiO2 films, using multiple diagnostics such as attenuated total reflection Fourier transform infrared (ATR-FTIR) spectroscopy, optical emission spectroscopy (OES), Langmuir probe measurements, and mass spectrometry. |
| 8/96 – 10/96 | ***Visiting NSF Scholar* at Seoul National University, Korea:**  Studied nitrogen incorporation in GaN films during remote plasma enhanced metal organic chemical vapor deposition (RPE-MOCVD) from TEGa and N2 using OES and Langmuir probe. |
| 6/96 – 8/96 | ***Visiting NSF Scholar* at Tokyo Institute of Technology, Japan:**  Developed a continuous thermal process to deposit stacked layers of polycrystalline Si and SiGe films on glass substrate using Si2H6 and GeF4 for thin film transistors (TFT) used in active matrix liquid crystal displays (AMLCD). |
| 6/94 – 8/94 | ***Summer Intern* at Lam Research Corporation, Fremont, CA:**  Participated in product development. Performed radio frequency power studies in a transformer coupled plasma (TCP) reactor to assess the impact of ion mass and energy on SiO2 film properties. |
| 12/92 – 9/93 | ***Process Engineer* at Lam Research Corporation, Fremont, CA:**  Demonstrated to customers, such as IBM, Motorola, Cypress, and Hyundai, system performance of Rainbow polysilicon plasma etchers. Served as a translator for TCP start-up at Samsung and LG. |

#### PUBLICATIONS – 2064 citations, *h*-index 25, *i10*-index 39

*In preparation*

1. Omar K. Abudayyeh, Cayla Nelson, Geoffrey K. Bradshaw, Steven Whipple, David M. Wilt, and Sang M. Han, “Crack-Tolerant Silver-Carbon-Nanotube Metal Matrix Composites as Photovoltaic Gridlines,” *IEEE J. Photovolt.*
2. Omar K. Abudayyeh, Andre Chavez, John Chavez, Sang M. Han\*, Francesco Zimbardi, Brian Rounsaville, Vijay Upadhyaya, Ajeet Rohatgi, Byron McDanold, and Timothy Silverman, *IEEE J. Photovolt.* \*corresponding author
3. Seok-Jun Han, Swapnadip Ghosh, Omar Abudayyeh, Eric J. Martin, John Grey, Sang M. Han, and Sang Eon Han, “Enhanced Light Absorption in Organic Solar Cells by Symmetry-Breaking Plasmonic Nanostructures,” *ACS Photon.*
4. Swapnadip Ghosh, Talid Sinno, and Sang M. Han, “Device Implications of Achieving Sub-105-cm-2 Dislocation Density by Oxygen Precipitates in Epitaxial Ge on Si,” *J. Appl. Phys.*
5. Louis J. Tribby, Cornelius F. Ivory, Frank von Swol, and Sang M. Han, “Experimental characterization and modeling of aspect-ratio-dependent diffusion of nanocrystals in nanochannels,” *Phys. Rev E*.
6. Youn-Jin Oh, Louis Tribby, Cornelius F. Ivory, and Sang M. Han, “High-Resolution Focusing and Separation of Proteins in Nanofluidic Channels,” *Lab Chip*.

*Submitted*

1. Seung Ho Lee, Sang M. Han, and Sang Eon Han, “Characterizing Randomness in Photonic Glasses Using Autocorrelation Functions of Two-Dimensional Images,” *Phys. Rev. B* submitted (2019).
2. S. E. Han, S. Atiganyanun, S. H. Lee, S. Cheek, and S. M. Han, “Determination of Internal Reflectance for Photonic Glasses,” *Phys. Rev. B* submitted (2019).

*Published*

1. Joseph D. Alden, Sarun Atiganyanun, Robert Vanderburg, Seung Ho Lee, John B. Plumley, Omar K. Abudayyeh, Sang M. Han, and Sang Eon Han, “Radiative Cooling by Silicone-Based Coating with Randomly Distributed Microbubble Inclusions,” *J. Photon. Energy* **9**(3), 032705-1:10 (2019).
2. Sarun Atiganyanun, John Plumley, Kevin Hsu, Jacob Cytrynbaum, Thomas L. Peng, Sang M. Han, and Sang Eon Han, “Effective Radiative Cooling by Paint-Format Microsphere-Based Photonic Random Media,” *ACS Photon.* **5**(4), 1181-1187 (2018).
3. John B. Plumley, Adam W. Cook, Christopher A. Larsen, Kateryna Artyushkova, Sang M. Han, Thomas Peng, and Richard A. Kemp, “Crystallization of electrically conductive visibly transparent ITO thin films by wavelength-range-specific pulsed Xe arc lamp annealing,” *J. Mater. Sci.* **53**(18), 12949-12960 (2018).
4. Daniel Kaiser, Sang M. Han, and Talid Sinno, “Parametric Analysis of Mechanically Driven Compositional Patterning in SiGe Substrates,” *J. Appl.* *Phys*. **121**(6), 065303-1:11 (2017).
5. Sarun Atiganyanun, Mi Zhou, Omar K. Abudayyeh, Sang M. Han, and Sang Eon Han, “Control of Randomness in Microsphere-Based Photonic Crystals Assembled by Langmuir-Blodgett Process,” *Langmuir* **33**(48), 13783-13789 (2017).
6. Seok-Jun Han, Swapnadip Ghosh, Omar Abudayyeh, Brittany R. Hoard, Ethan C. Culler, Jose Bonilla, Sang M. Han, and Sang Eon Han, “Symmetry-Breaking Nanostructures on Crystalline Silicon for Enhanced Light-Trapping in Thin Film Solar Cells,” *Opt. Express* **24**(26), A1586-A1596 (2016).
7. Daniel Kaiser, Swapnadip Ghosh, Sang M. Han, and Talid Sinno “Modeling and Simulation of Compositional Engineering in SiGe Films using Patterned Stress Fields,” *Mol. Syst. Des. Eng.* **1**(1), 74-85 (2016).
8. Omar K. Abudayyeh, Nathan D. Gapp, Cayla Nelson, David M. Wilt, and Sang M. Han, “Silver-Carbon-Nanotube Metal Matrix Composites for Metal Contacts on Space Photovoltaics,” *IEEE J. Photovolt.* **PP**(99), 1-6 (2015) and **6**(1), 337-342 (2016).
9. Claire Y. Chuang, Sang M. Han, Luis A. Zepeda-Ruiz, and Talid Sinno, “On Course Projective Integration for Atomic Deposition in Amorphous Systems,” *J. Chem. Phys.* **143**(13), 134703 (2015).
10. Swapnadip Ghosh, Daniel Kaiser, Jose Bonilla, Talid Sinno, and Sang M. Han, “Stress-Directed Compositional Patterning of SiGe Substrates for Lateral Quantum Barrier Manipulation,” *Appl. Phys. Lett.* **107** 072106:1-5 (2015).
11. Swapnadip Ghosh, Seok-Jun Han, Brittany R. Hoard, Ethan C. Culler, Jose E. Bonilla, Eric J. Martin, John Grey, Sang M. Han, and Sang Eon Han, “Symmetry-Breaking Nanostructures for Enhanced Light-Trapping in Thin Film Solar Cells,” *Proc. 42nd IEEE PVSC* 1-3 (2015). DOI: 10.1109/PVSC.2015.7356305
12. Nicholas Shoop, Louis J. Tribby, and Sang M. Han, “Modeling of Kinetically Limited Growth Rate for Solution-Synthesized Germanium Nanocrystals,” *Mater. Res. Express* **2** 085007 (2015).
13. Claire Y. Chuang, Louis Zepeda-Ruiz, Sang M. Han, and Talid Sinno, “Direct Molecular Dynamics Simulation of Ge Deposition on Amorphous SiO2 at Experimentally Relevant Conditions,” *Surf. Sci*. **641** 112-120 (2015).
14. Swapnadip Ghosh and Sang M. Han, “High-Carrier-Mobility p- and n-Type MOSFETs Fabricated on Wafer-Scale Planar Ge Film Epitaxially Grown on Si,” *IEEE Electr. Device L.* **35**(9) 900-902 (2014).
15. Swapnadip Ghosh, Darin Leonhardt, and Sang M. Han, “Effect of threading dislocation density and dielectric layer on temperature-dependent dc characteristics of metal semiconductor field effect transistors fabricated on epitaxially grown Ge on Si substrates,” *J. Appl. Phys.* **115**(9), 094507 (2014).
16. Josephine J. Sheng, Darin Leonhardt, Sang M. Han, Steven W. Johnston, Jeffrey G. Cederberg, and Malcolm S. Carroll, “Empirical Correlation for Minority Carrier Lifetime to Defect Density Profile in Germanium on Silicon Grown by Nanoscale Interfacial Engineering,” *J. Vac. Sci. Technol. B* **31**, 051201(2013).
17. W. C. T. Lee, N. Bishop, D. L. Thompson, K. Xue, G. Scappucci, J. G. Cederberg, J. K. Gray, S. M. Han, G. K. Celler, M. S. Carroll, and M. Y. Simmons, “Thermal processing of strained silicon-on-insulator for atomically precise silicon device fabrication,” *Appl. Surf. Sci.* **265**, 833-838 (2013).
18. Claire Y. Chuang, Qiming Li, Darin Leonhardt, Sang M. Han, and Talid Sinno, “Atomistic Analysis of Ge on Amorphous SiO2 using an Empirical Interatomic Potential,” *Surf. Sci*. **609**, 221-229 (2013).
19. Swapnadip Ghosh, Darin Leonhardt, and Sang M. Han, “Investigations on Thermal Stress Relief Mechanism Using Air-Gapped SiO2 Nanotemplates during Epitaxial Growth of Ge on Si and Corresponding Hole Mobility Improvement,” *ECS Trans*. **45**(4), 111-114 (2012). DOI: 10.1149/1.3700459
20. Darin Leonhardt and Sang M. Han, “New Method to Produce High-Quality Epitaxial Ge on Si Using SiO2-Lined Etch Pits and Epitaxial Lateral Overgrowth for III-V Integration,” *ECS Trans.* **45**(4), 147-149 (2012). DOI: 10.1149/1.3700464
21. Josephine J. Sheng, David C. Chapman, David M. Wilt, Stephen J. Polly, Christopher G. Kerestes, Seth M. Hubbard, and Sang M. Han, “Temperature Dependent Characterization of Imbedded InAs Quantum Dots in GaAs Superlattice Solar Cells Structures by High Resolution X-ray Diffraction,” MRS Proc. **1432** (2012). DOI: http://dx.doi.org/10.1557/opl.2012.1139
22. Swapnadip Ghosh, Darin Leonhardt, and Sang M. Han, “Experimental and theoretical investigation of stress relief during epitaxial growth of Ge on Si using air-gapped SiO2 nanotemplates,” *Appl. Phys. Lett.* **99**(18), 181911 (2011) and *Virtual Journal of Nanoscale Science & Technology* (November 21, 2011). DOI: 10.1063/1.3659320
23. Darin Leonhardt, Swapnadip Ghosh, and Sang M. Han, “Defects in Ge Growth in Trench Patterned SiO2 on Si and Ge substrates,” *J. Cryst. Growth* **335**(1), 62-65 (2011). DOI: 10.1016/j.jcrysgro.2011.09.022
24. Darin Leonhardt and Sang M. Han, “Dislocation Reduction in Heteroepitaxial Ge on Si Using SiO2 Lined Etch Pits and Epitaxial Lateral Overgrowth,” *Appl. Phys. Lett.* **99**(11), 111911 (2011). DOI: 10.1063/1.3632113
25. Darin Leonhardt, Swapnadip Ghosh, and Sang M. Han, “Origin and Removal of Stacking Faults in Ge Islands Nucleated on Si within Nanoscale Openings in SiO2,” *J. Appl. Phys.* **110**, 073516 (2011) and *Virtual Journal of Nanoscale Science & Technology* (October 24, 2011). DOI: 10.1063/1.3643003
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27. Darin Leonhardt, Josephine Sheng, Jeffrey G. Cederberg, Malcolm S. Carroll, and Sang M. Han, “Nanoscale Interfacial Engineering to Grow Ge on Si as Virtual Substrates and Subsequent Integration of GaAs,” *Thin Solid Films* **518**(21), 5920-5927 (2010). DOI: 10.1016/j.tsf2010.05.085
28. Jeffrey G. Cederberg, Darin Leonhardt, Josephine J. Sheng, Qiming Li, Malcolm S. Carroll, and Sang M. Han, “GaAs/Si epitaxial integration utilizing a two-step, selectively grown Ge intermediate layer,” *J. Cryst. Growth* **312**(8), 1291-1296 (2010). DOI: 10.1016/j.jcrysgro.2009.10.061
29. Timothy J. Boyle, Louis J. Tribby, Leigh Anna M. Ottley, and Sang M. Han, “Synthesis and Characterization of Germanium(II) Coordination Compounds for the Production of Germanium Nanomaterials,” *Eur. J. Inorg. Chem.* **2009**(36), 5550-5560 (2009).
30. Darin Leonhardt and Sang M. Han, “Energetics of Ge Nucleation on SiO2 and Implications for Selective Epitaxial Growth,” *Surf. Sci.* **603**, 2624-2629 (2009).
31. Youn-Jin Oh, Danny Bottenus, Cornelius F. Ivory, and Sang M. Han, “Impact of Leakage Current and Electrolysis on FET Flow Control and pH Changes in Nanofluidic Channels,” *Lab Chip* **9**(11), 1609-1617 (2009).
32. Youn-Jin Oh, Anthony L. Garcia, Dimiter N. Petsev, Gabriel P. Lopez, Steven R. J. Brueck, Cornelius F. Ivory, and Sang M. Han, “Effect of wall-molecule interactions on electrokinetic transport of charged molecules in nanofluidic channels during FET flow control,” *Lab Chip* **9**(11), 1601-1608 (2009).
33. Danny Bottenus, Youn-Jin Oh, Sang M. Han, and Cornelius F. Ivory, “Experimentally and Theoretically Observed Native pH Shifts in a Nanochannel Array,” *Lab Chip* **9**(2), 219-231 (2009). Selected as a hot LOC article.
34. Youn-Jin Oh, Thomas C. Gamble, Darin Leonhardt, Dimiter N. Petsev, Cornelius F. Ivory, Chan-Hwa Chung, Steven R. J. Brueck, Gabriel P. Lopez, and Sang M. Han, “Monitoring FET Flow Control and Wall Adsorption of Charged Fluorescent Dye Molecules in Nanochannels Integrated into a Multiple Internal Reflection Infrared Waveguide,” *Lab Chip* **8**, 251-258 (2008).
35. Timothy N. Lambert, Nicholas L. Andrews, Henry Gerung, Timothy J. Boyle, Janet M. Oliver, Bridget S. Wilson, and Sang M. Han, “Water-soluble germanium(0) nanocrystals: Cell recognition and near-infrared photothermal conversion properties,” *Small* **3**(4), 691-699 (2007).
36. Qiming Li, Joshua L. Krauss, Stephen Hersee, and Sang M. Han, “Understanding the Interaction of Ge with Chemical and Thermal SiO2 for Selective Growth of Ge on Si by Molecular Beam Epitaxy,” *J. Phys. Chem.* C **111**, 779-786 (2007).
37. Kyle J. Solis, Lance R. Williams, Brian S. Swartzentruber, and Sang M. Han, “Adatom Pair Chain Structures: Metastable Precursors to Island Formation on SiGe 2xN Alloy,” *Surf. Sci.* **601**(1), 172-177 (2006).
38. Henry Gerung, Yanrui Zhao, Ravi Jain, Timothy J. Boyle, C. Jeffrey Brinker, and Sang M. Han, “Nonlinear Optical Response of Solution Synthesized Ge Nanocrystals,” *Appl. Phys. Lett.* **89**, 111107 (2006); *Virtual Journal of Nanoscale Science & Technology*, September 25 (2006); and *Virtual Journal of Ultrafast Science*, October (2006).
39. Qiming Li and Sang M. Han, “Formation of Epitaxial Ge Nanorings on Si by Self-assembled SiO2 Particles and Touchdown of Ge Through a Thin Layer of SiO2,” *MRS Proc.* **921**, 0921-T02-04 (2006).
40. Henry Gerung, Timothy J. Boyle, Louis J. Tribby, Scott D. Bunge, C. Jeffrey Brinker, and Sang M. Han, “Solution Synthesis of Germanium Nanowires Using a Ge+2 Alkoxide Precursor,” *J. Am. Chem. Soc.* **128**(15), 5244-5250 (2006).
41. Madhava Kosuri, Henry Gerung, Qiming Li, Sang M. Han, Paulo Herrera, and Jason Weaver “Vapor‑Phase Adsorption Kinetics of 1‑Decene on Hydrogenated Si(111),” *Surf. Sci.* **596**, 21-38 (2005).
42. Qiming Li, Belliappa Pattada, Steve R. J. Brueck, Stephen Hersee, and Sang M. Han, “Morphological Evolution and Strain Relaxation of Ge Islands Grown on Chemically Oxidized Si(100) by Molecular Beam Epitaxy,” *J. Appl. Phys.* **98**(7), 073504 (2005).
43. Qiming Li, Ying-Bing Jiang, Joshua L. Krauss, Huifang Xu, Steven R. J. Brueck, Stephen Hersee, and Sang M. Han, “Heteroepitaxy of high-quality Ge on Si by nanoscale seed pads grown through a SiO2 interlayer,” *Proc. SPIE – Int. Soc. Opt. Eng.* **5734**, 75-82 (2005).
44. Henry Gerung, Scott D. Bunge, Timothy J. Boyle, C. Jeffrey Brinker, and Sang M. Han, “Anhydrous Solution Synthesis of High-Quality Ge Nanocrystals from the Germanium (II) Precursor Ge[N(SiMe3)2]2,” *Chem. Commun*. **14**, 1914-1916 (2005).
45. Henry Gerung, C. Jeffrey Brinker, Steve R. J. Brueck, and Sang M. Han, “*In situ* real-time monitoring of profile evolution during plasma etching of mesoporous low-dielectric-constant SiO2,” *J. Vac. Sci. Technol. A* **23**(2), 347 (2005).
46. Qiming Li, Ying-Bing Jiang, Huifang Xu, Steve Hersee, and Sang M. Han “Heteroepitaxy of high quality Ge on Si by nanoscale Ge seeds grown through a thin layer of SiO2,” *Appl. Phys. Lett.* **85**(11), 1928-1930 (2004) and *Virtual Journal of Nanoscale Science & Technology*, October 4 (2004).
47. Madhava R. Kosuri, Roya Cone, Qiming Li, Sang M. Han, Bruce C. Bunker, and Thomas M. Mayer, “Adsorption Kinetics of Alkanethiol Self-Assembly on Ge(111),” *Langmuir* **20**(3), 835 (2004).
48. Qiming Li, Sang M. Han\*, Steven R. J. Brueck, Stephen Hersee, Ying-Bing Jiang, and Huifang Xu, “Selective growth of Ge on Si(100) through vias of SiO2 nanotemplate using solid source molecular beam epitaxy,” *Appl. Phys. Lett.* **83**(24), 5032-5034 (2003). \*corresponding author
49. Madhava R. Kosuri, Henry Gerung, Sang M. Han, Bruce C. Bunker, and Thomas M. Mayer, “Vapor-phase Adsorption Kinetics of 1‑Decene on H-terminated Si(100),” *Langmuir* **19**(22), 9315 (2003).
50. Dhaval A. Doshi, Alain Gibaud, Valerie Goletto, Mengcheng Lu, Henry Gerung, Benjamin Ocko, Sang M. Han, and C. Jeffrey Brinker, “Peering into the self-assembly of surfactant templated thin-film silica mesophases,” *J. Am. Chem. Soc.* **125**, 11646 (2003).
51. Sang M. Han, Joseph L. Cecchi, and John J. Russell “HIGH PERFORMANCE ENGINES: FAST CARS ACCELERATE LEARNING,” *Chem. Eng. Educ.* **37**(3), 208 (2003).
52. Sang M. Han, W. Robert Ashurst, Carlo Carraro, and Roya Maboudian, “Formation of Alkanethiol Monolayer on Ge(111),” *J. Am. Chem. Soc.* **123**, 2422 (2001).
53. S. M. Han and E. S. Aydil, “Reasons for lower dielectric constant of fluorinated SiO2 films,” *J. Appl. Phys.* **83**, 2172 (1998).
54. E. Meeks, R. S. Larson, P. Ho, C. Apblett, S. M. Han, E. Edelberg, and E. Aydil, “Modeling of SiO2 deposition in high density plasma reactors and comparisons of model predictions with experimental measurements,” *J. Vac. Sci. Technol. A* **16**, 544 (1998).
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56. S. M. Han and E. S. Aydil, “Silanol concentration depth profiling during plasma deposition of SiO2 using multiple internal reflection infrared spectroscopy,” *J. Electrochem. Soc.* **144**, 3963 (1997).
57. S. M. Han and E. S. Aydil, “Detection of combinative infrared absorption bands in thin silicon dioxide films,” *Appl. Phys. Lett.* **70**, 3269 (1997).
58. S. M. Han and E. S. Aydil, “Plasma and surface diagnostics during plasma-enhanced chemical vapor deposition of SiO2 from SiH4/O2/Ar discharges,” *Thin Solid Films* **290 - 291**, 427 (1996).
59. S. M. Han and E. S. Aydil, “Study of surface reactions during plasma enhanced chemical vapor deposition of SiO2 from SiH4, O2, and Ar,” *J. Vac. Sci. Technol. A* **14**, 2062 (1996).
60. Alex P. Sassi, Anita J. Shaw, Sang M. Han, Harvey W. Blanch, and John M. Prausnitz, “Partitioning of proteins and small biomolecules in temperature- and pH-sensitive hydrogels,” *Polymer*, **37**(11), 2151-2164 (1996).
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**INVITED/CONTRIBUTED PAPERS**

*Invited*

1. Sang M. Han, “Materials Engineering Solutions to Solar Module Reliability and Passive Cooling: Durability and Conservation in Tandem,” Case Western Reserve University, Cleveland, OH (November 15, 2018).
2. Brian Rummel, Michael Rimada, Sadhvikas Addamane, Ganesh Balakrishnan, Daniel Kaiser, Talid Sinno, and Sang M. Han, “Imaging Stress-Induced Lateral Quantum Barrier Manipulation of InGaAs Quantum Wells, Using Micro-Photoluminescence Spectroscopy,” iPlasmaNano-IX 2018, New Buffalo, MI (August 27, 2018).
3. Sang M. Han, “From Materials Engineering to Device Applications: Testing Our Understanding of Nature,” University of Virginia, Charlottesville, VA (April 12, 2017).
4. Sang M. Han, “From Nanoscale Materials Engineering to Advanced Devices Based on Germanium and Silicon,” Materials Science & Technology 2012 Conference & Exhibition, Pittsburg, PA (October 8, 2012).
5. Sang M. Han, “Nanoscale Interfacial Engineering to Grow Ge on Si as Virtual Substrates and Subsequent Integration of GaAs,” University of Texas – Austin (September 27, 2011).
6. Sang M. Han, “Nanoscale Interfacial Engineering to Grow Ge on Si as Virtual Substrates and Subsequent Integration of GaAs,” Stanford University (March 7, 2011).
7. Youn-Jin Oh, Danny Bottenus, Thomas C. Gamble, Anthony Garcia, Dimiter N. Petsev, Cornelius F. Ivory, Steven R. J. Brueck, Gabriel P. Lopez, and Sang M. Han\*, “Control and Separation of Proteins in a Nanofluidic FET Device, using pH Gradient and Valence Charge,” Annual AIChE Meeting, Philadelphia, PA (November 18, 2008).
8. Sang M. Han, “Nanoscale Heterojunction Engineering and Understanding of Surface Phenomena Responsible for the Selective Growth of Ge on Si over SiO2 During Molecular Beam Epitaxy,” Auburn University (April 9, 2007).
9. Sang M. Han, “Nanoscale Heterojunction Engineering and Selective Growth of High-Quality Ge on Si by Molecular Beam Epitaxy,” Annual TMS Meeting, New Orleans, LA (March 11, 2008).
10. Sang M. Han, “Nanoscale Heterojunction Engineering and Understanding of Surface Phenomena Responsible for the Selective Growth of Ge on Si over SiO2 During Molecular Beam Epitaxy,” University of Pennsylvania (September 26, 2007).
11. Gabriel P. Lopez, Steven R. J. Brueck, Sang M. Han, Cornelius F. Ivory, Dimiter N. Petsev, and Scott S. Sibbett, “Materials Processing Methods and Issues in the Development of Nanofluidic Systems for Biomolecular Analysis,” Spring MRS Meeting, San Francisco, CA (April 12, 2007).
12. Sang M. Han, “Understanding of Surface Phenomena Responsible for the Selective Growth of Ge on Si over SiO2 During Molecular Beam Epitaxy,” University of California – Riverside, CA (April 21, 2006).
13. Sang M. Han, “Understanding of Surface Phenomena Responsible for the Selective Growth of Ge on Si over SiO2 During Molecular Beam Epitaxy,” Colorado School of Mines, Golden, CO (February 3, 2006).
14. Sang M. Han, “Understanding of Surface Phenomena Responsible for the Selective Growth of Ge on Si over SiO2 During Molecular Beam Epitaxy,” Washington State University, Pullman, WA (October 10, 2005).
15. Sang M. Han, “*In Situ* Real-Time Monitoring of Evaporation Induced Self-Assembly of Mesoporous Low-Dielectric Constant SiO2 and Its Profile Evolution During Plasma Etching,” Northern California Chapter of the American Vacuum Society PEUG/TFUG Annual Symposium, San Jose, CA (October 2005).
16. Sang M. Han, “Understanding of Surface Phenomena Responsible for the Selective Growth of Ge on Si over SiO2 During Molecular Beam Epitaxy,” Rensselaer Polytechnic Institute (September 2005).
17. Sang M. Han, “Micro to Atomic Scale Interfacial Science and Engineering on Si and Ge Based Systems,” University of Massachusetts – Amherst, MA (March 1, 2005).
18. Sang M. Han, “Molecular beam epitaxy of high-quality Ge on Si by self-directed “touchdown” of nanoscale seed pads through a thin SiO2,” SPIE Photonics West 2005, San Jose, CA (January 24, 2005).
19. Sang M. Han, “Micro to Atomic Scale Surface Science and Engineering on Si and Ge Based Systems,” Los Alamos National Laboratory (June 28, 2004).
20. Sang M. Han, “Micro to Atomic Scale Surface Science and Engineering on Si and Ge Based Systems,” University of Florida, Gainesville, FL (April 19, 2004).
21. Sang M. Han, “Micro to Atomic Scale Surface Science and Engineering on Si and Ge Based Systems,” University of California Santa Barbara, Santa Barbara, CA (April 1, 2004).
22. Sang M. Han, “Micro to Atomic Scale Surface Science and Engineering on Si and Ge Based Systems,” University of California Los Angeles, Los Angeles, CA (February 27, 2004).
23. Sang M. Han, “Micro to Atomic Scale Surface Science and Engineering on Si and Ge Based Systems,” Sandia National Laboratories, Albuquerque, NM (February 12, 2004).
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**PATENT APPLICATIONS AND ISSUED PATENTS** – 6 pending applications and 19 issued patents

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**THESIS ADVISOR AND POSTGRADUATE-SCHOLAR SPONSOR**

**CURRENT STUDENTS, POSTDOCTORAL RESEARCHERS, AND RESEARCH PROFESSORS**

Leonid Miroshnik, PhD (2018 – present)

Andre Chavez, PhD (2017 – present)

Bokyung Park, PhD (2017 – present)

Seung-Ho Lee, Postdoctoral Researcher (2017 – present)

Lyle Menk, PhD (2016 – present)

Brian Rummel, PhD (2015 – present)

John Plumley, Postdoctoral Researcher (2014 – present)

Seok Jun Han, PhD (2014 – present)

Cayla Nelson, PhD (2014 – present)

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**TOTAL NUMBER OF RESEARCH FACULTY AND STUDENTS ADVISED:** 2 Postdoctoral Researchers, 8 PhD students currently advised; 7 PhDs and 8 MSs graduated; 1 postdoctoral researcher mentored; 1 research faculty advised

**PhD** of Omar Abudayyeh “Development of Metal Matrix Composite Gridlines for Space Photovoltaics” (October 2016).

**PhD** of Swapnadip Ghosh “Large-Area, Wafer-Scale Epitaxial Growth of Germanium on Silicon and Integration of High-Performance Transistors” (December 2014).

**PhD** of Josephine J. Sheng “Empirical Correlation of Minority Carrier Lifetime to Defect Density Profile in Germanium on Silicon Heteroepitaxy” (May 6, 2013).

**PhD** of Louis Tribby “Experimental and Theoretical Comparison of Aspect-Ratio-Dependent Diffusion of CdSe Nanocrystals Through Nanochannels” (April 12, 2013).

**PhD** of Darin Leonhardt “Selective Epitaxial Growth Techniques to Integrate High-Quality Germanium on Silicon” (May 2011).

**PhD** of Henry Gerung “Germanium Nanomaterials: Synthesis, Characterization, and Applications” (April 6, 2006).

**PhD** of Qiming Li “Selective Molecular Beam Epitaxy of Germanium on Oxide-Covered Silicon” (June 17, 2005).

**Plan I MS** of Lyle Menk, “Copper Electrodeposition in Mesoscale Through-Silicon Vias,” (July 13, 2017).

**Plan I MS** of Emilee Reinholz “Composition and Manufacturing Effects on Electrical Properties of Li/FeS2 Thermal Battery Cathodes,” (October 2015).

**Plan I MS** of Nicholas Shoop “Modeling of Kinetically Limited Growth Rate for Solution-Synthesized Germanium Nanocrystals” (May 2014).

**Plan I MS** of Kyle J. Solis “Atomic-Level Investigation of Surface Processes Governing SiGe Wetting layer Formation Using STM/STS” (March 31, 2010).

**Plan I MS** of Madhava Kosuri "Formation of Self-Assembled Monolayers on Semiconductor Surfaces" (October 28, 2003).

**Plant II MS** of Nicholas Brechtel “Near IR Absorber Using Ge Structures on Si” (November 3, 2016).

**Plan II MS** of Alfonso Navarrete “Adhesion Output Improvement and Defect Reduction Through Enhanced TiN Process Recipes” (December 6, 2005).

**Plan II MS** of Jeffrey O. Stevens “Process Optimization of Polycrystalline Si Etch in Cl2/HBr Plasma: Minimization of Isolated-to-Dense Critical Dimension Bias” (April 14, 2004).

**Postdoctoral Researcher:** Younjin Oh, protein and nanoparticle separations in nanofluidic FET devices (2005 – 2008)

**Research Faculty:** Dr. Thomas M. Mayer, Research Professor (2009 – 2011)

**AWARDS**

* STC.UNM Innovation Fellow (2018)
* STC.UNM Creative Awards (2009 – 2018)
* University of New Mexico Regents Professor (2015)
* Air Force Summer Faculty Fellowship Program (2015)
* Air Force Summer Faculty Fellowship Program (2014)
* Air Force Summer Faculty Fellowship Program (2012)
* University of New Mexico School of Engineering Teaching Award (2012)
* Nomination for University of New Mexico Regents Lectureship (2011)
* Nomination for University of New Mexico School of Engineering Teaching Award (2006, 2011)
* University of New Mexico School of Engineering Junior Faculty Research Excellence Award (2005)
* Nomination for University of New Mexico Teacher of the Year (TOYA) Award (2003)
* ASEE Chemical Engineering Faculty Summer School Poster Session Winner (2002)
* National Science Foundation CAREER Award (2001)
* The Electrochemical Society Norman Hackerman Young Author Award (1998)
* National Science Foundation Summer Institute in Korea (1996)
* National Science Foundation Summer Institute in Japan (1996)