

# ERAY S. AYDIL

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## EDUCATION

**University of Houston, Texas.**

Ph.D. in Chemical Engineering, August 1991.

**University of California Berkeley, California.**

B. S. in Chemical Engineering, and

B. S. in Materials Science and Engineering, August 1986.

## PROFESSIONAL EXPERIENCE & APPOINTMENTS

|              |                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 9/21-present | Chair, Department of Chemical and Biomolecular Engineering                                                                                                                                                                                                                                                                                                                                          |
| 9/18-present | Alstadt Lord Mark Professor,<br>New York University, Tandon School of Engineering<br>Department of Chemical and Biomolecular Engineering<br>Research focuses on renewable energy, energy storage and conversion, fundamental aspects of electronic and optoelectronic materials, plasma chemistry and physics, plasma etching and deposition, and plasma treatment of materials and their surfaces. |
| 9/10-present | Editor-in-Chief, Journal of Vacuum Science & Technology A & B                                                                                                                                                                                                                                                                                                                                       |
| 6/09-9/18    | Professor and Ronald L. and Janet A. Christenson Chair in Renewable Energy<br>University of Minnesota, Chemical Engineering and Materials Science Department                                                                                                                                                                                                                                        |
| 10/16-9/18   | Institute on the Environment (IonE) Fellow                                                                                                                                                                                                                                                                                                                                                          |
| 6/09-6/14    | Professor and Executive Officer<br>University of Minnesota, Chemical Engineering and Materials Science Department                                                                                                                                                                                                                                                                                   |
| 3/05-6/09    | Professor<br>University of Minnesota, Chemical Engineering and Materials Science Department                                                                                                                                                                                                                                                                                                         |
| 7/01-3/05    | Professor and Vice Chairman<br>University of California Santa Barbara, Department of Chemical Engineering                                                                                                                                                                                                                                                                                           |
| 7/98- 7/01   | Associate Professor<br>University of California Santa Barbara, Department of Chemical Engineering                                                                                                                                                                                                                                                                                                   |
| 4/93- 7/98   | Assistant Professor<br>University of California Santa Barbara, Department of Chemical Engineering                                                                                                                                                                                                                                                                                                   |
| 9/91-4/93    | Postdoctoral Member of Technical Staff<br>AT&T Bell Laboratories, Murray Hill, New Jersey<br>Postdoc Advisor: Dr. Richard Gottscho.                                                                                                                                                                                                                                                                 |
| 9/86-9/91    | Graduate Research Assistant<br>University of Houston, Department of Chemical Engineering, Houston, Texas<br>Ph.D. thesis entitled "Experimental and Theoretical Investigation of Cl <sub>2</sub> Plasma Etching of Polysilicon." Research Advisor: Professor Demetre J. Economou.                                                                                                                   |

## PATENTS

- (1) Method for Controlling Plasma Processes;  
with R. A. Gottscho, J. A. Gregus, and M. A. Jarnyk, 1994, US Patent # 5,277,752.
- (2) Method of Making a Silicon-Based Device Comprising Surface Plasma Cleaning;  
with R. A. Gottscho and Z. Zhou, 1995, US Patent # 5,413,954.
- (3) Downstream Ammonia Plasma Passivation of GaAs;  
with K. P. Giapis, and R. A. Gottscho, 1995, US Patent # 5,464,664.
- (4) Non-Stick Electroconductive Amorphous Silica Coating;  
with M. Sutcu and J. S. Gentelia, 1996, US Patent # 5,549,604.
- (5) Optoelectronic Devices with Thin Barrier Films with Crystalline Characteristics that are Conformally Coated onto Complex Surfaces to Provide Protection Against Moisture;  
with R. K. Feist, B. S. Tosun and S. A. Campbell, 2013, Application WO2013019608 A1.
- (6) Metal Chalcogenides and Methods of Making and Using the Same;  
with A. Khare, D. J. Norris, B. S. Tosun and A. Wills, 2014, 20140216555.
- (7) Production of conductive metal oxide film used in electronic device, involves converting mixture comprising metal precursor and oxygen-containing compound into particles, and depositing and coating particles with metal oxide;  
with Y. Zhou, B. Sachweh, E. Thimsen, E. S. Aydil and U. Kortshagen, 2016, WO2015162035-A1

## SELECTED AWARDS

- Horace T. Morse-University of Minnesota Alumni Association Award for Outstanding Contributions to Graduate and Professional Education, 2017.
- Academy of Distinguished Teachers Inductee, Distinguished University Teaching Professor, 2017
- Plasma Prize of the Plasma Science and Technology Division of the AVS "...for pioneering work on the characterization of plasma species and their energy distributions in plasma assisted deposition and etching of materials," 2009.
- Fellow of the AVS, "For significant contributions to fundamental understanding of plasma surface interactions using both theoretical and experimental methods," 2005.
- University of Houston Distinguished Young Engineering Alumnus, 2005.
- Peter Mark Memorial Award of the American Vacuum Society, "...for pioneering work in the development and application of optical diagnostic techniques to understand chemistry and physics associated with plasma deposition of dielectric thin films," 1999.
- American Institute of Chemical Engineers – University of California Santa Barbara Chapter, Professor of the Year Award for Excellence in Teaching, 1999.
- Camille Dreyfus Teacher-Scholar Award, 1997.
- University of California Santa Barbara Mortar Board Professor of the Year Award, 1996.
- National Science Foundation National Young Investigator Award, 1994.
- Norman Hackerman Young Author Award of The Electrochemical Society, "...in recognition of a paper in the field of Solid State Science and Technology published in the Society Journal in 1992.", 1993.
- American Institute of Chemical Engineers, Engineering Foundation Research Initiation Award, 1993.
- University of Houston, Teaching Excellence Award, 1991.

## PUBLICATIONS

1. G. Barna, J. Spatafora, E. S. Aydil and D. J. Economou, "Spectroscopic Measurement of Etchant Concentration Profiles in a Parallel Plate Plasma Reactor," *Proceedings of the Second Annual Conference of the Society of Manufacturing Engineers*, Technical Paper MS90-476 (1990).
2. E. S. Aydil and D. J. Economou, "Experimental and Modeling Studies of Chlorine RF Glow Discharges," in *The Proceedings of the Eighth Symposium on Plasma Processing*, **PV 90-14**, G. S. Mathad and D. W. Hess, editors, p. 77, The Electrochemical Society Softbound Proceedings Series, Pennington, NJ, (1990).
3. E. S. Aydil and D. J. Economou, "Multiple Steady States in a Radio Frequency Chlorine Glow Discharge," *J. Appl. Phys.* **69**, 109 (1991).

4. D. Economou, E. S. Aydil and G. Barna, "In Situ Monitoring of Etching Uniformity in Plasma Reactors," *Solid State Technology* **34** (4), 107 (April, 1991).
5. E. S. Aydil and D. J. Economou, "Theoretical and Experimental Investigations of Chlorine RF Glow Discharges: I. Theoretical," *J. Electrochem. Soc.* **139**, 1396 (1992).
6. E. S. Aydil and D. J. Economou, "Theoretical and Experimental Investigations of Chlorine RF Glow Discharges: II. Experimental," *J. Electrochem. Soc.* **139**, 1406 (1992).
7. E. S. Aydil and D. J. Economou, "Modeling of Plasma Etching Reactors Including Wafer Heating Effects," in *The Proceedings of the Ninth Symposium on Plasma Processing*, **PV 93-14**, G. S. Mathad and D. W. Hess, editors, p. 22, The Electrochemical Society Softbound Proceedings Series, Pennington, New Jersey, (1993).
8. E. S. Aydil and D. J. Economou, "Modeling of Plasma Etching Reactors Including Wafer Heating Effects," *J. Electrochem. Soc.* **140**, 1471 (1993).
9. E. S. Aydil, K. P. Giapis, R. A. Gottscho, V. M. Donnelly, and E. Yoon, "Ammonia Plasma Passivation of GaAs in Downstream Microwave and RF Parallel Plate Plasma Reactors," *J. Vac. Sci. Technol.* **B 11**, 195 (1993).
10. E. S. Aydil, Z. Zhou, K. P. Giapis, Y. J. Chabal, J. A. Gregus, and R. A. Gottscho, "Real Time, In Situ Monitoring of Surface Reactions During Plasma Passivation of GaAs," *Appl. Phys. Lett.* **62**, 3156 (1993).
11. Z. Zhou, E. S. Aydil, R. A. Gottscho, Y. J. Chabal, and R. Reif, "Real Time, In Situ Monitoring of Room Temperature Silicon Surface Cleaning Using Hydrogen and Ammonia Plasmas," *J. Electrochem. Soc.* **140**, 3316 (1993).
12. E. S. Aydil, J. A. Gregus, and R. A. Gottscho, "Multiple Steady States in Electron Cyclotron Resonance Plasma Reactors," *J. Vac. Sci. Technol. A* **11**, 2883 (1993).
13. M. A. Jarnyk, J. A. Gregus, E. S. Aydil, and R. A. Gottscho, "Control of an Unstable Electron Cyclotron Resonance Plasma," *Appl. Phys. Lett.* **62**, 2039 (1993).
14. E. S. Aydil, J. A. Gregus, and R. A. Gottscho, "Electron Cyclotron Resonance Plasma Reactor for Cryogenic Etching," *Rev. Sci. Instrum.* **64**, 3572-3584 (1993).
15. E. S. Aydil, Z. H. Zhou, R. A. Gottscho, and Y. J. Chabal, "Real Time In Situ Monitoring of Surface Reactions During Plasma Passivation of GaAs," *Proceedings of the Eighteenth State-of-the-art Program on Compound Semiconductors (SOTAPOCS XVIII)*, Electrochemical Society Softbound Series **Vol. 93-27**, Pennington, New Jersey, p. 150 (1993).
16. E. S. Aydil, J. A. Gregus, M. A. Jarnyk, and R. A. Gottscho, "Multiple Steady States and Abrupt Transitions in an ECR Plasma Reactor," *Proceedings of the Symposium on Highly Selective Dry Etching and Damage Control*, Electrochemical Society Softbound Series **Vol. 93-21**, Pennington, New Jersey, p. 76, (1993).
17. Z. H. Zhou, E. S. Aydil, R. A. Gottscho, Y. J. Chabal, and R. Reif, "Real Time Monitoring of Silicon Surface Cleaning Using H<sub>2</sub> and NH<sub>3</sub> Plasmas," *Proceedings of the Symposium on Highly Selective Dry Etching and Damage Control*, Electrochemical Society Softbound Series **Vol. 93-21**, Pennington, New Jersey, p. 35, (1993).
18. J. A. Mucha, D. W. Hess, and E. S. Aydil, "Chapter 5: Plasma Etching" in *Introduction to Microlithography*, edited by L. F. Thompson, C. G. Willson, and M. J. Bowden, American Chemical Society, Washington D.C., pp. 377-507 (1994).
19. E. S. Aydil and R. A. Gottscho, "Plasma Passivation of III-V Semiconductor Surfaces," in *Hydrogen in Compound Semiconductors*, edited by S. Pearton, Trans Tech Publications Materials Science Forum Series, **Vol. 148-149**, 159 (1994).
20. E. S. Aydil, R. A. Gottscho, and Y. J. Chabal, "Real Time Monitoring of Surface Chemistry During Plasma Processing," *Pure and Applied Chemistry* **66**, 1381 (1994).
21. S. C. Deshmukh and E. S. Aydil, "Low Temperature Plasma Enhanced Chemical Vapor Deposition of SiO<sub>2</sub>," *Appl. Phys. Lett.* **65**, 3185 (1994).

22. E. S. Aydil, "Plasma Etching," *Encyclopedia of Applied Physics*, American Institute of Physics and VCH Publishers, New York, **Vol. 14**, 171 (1995).
23. E. S. Aydil, Z. H. Zhou, R. A. Gottscho, and Y. J. Chabal, "Real Time In Situ monitoring of Surfaces During Glow Discharge Processing:  $\text{NH}_3$  and  $\text{H}_2$  Plasma Passivation of GaAs," *J. Vac. Sci. Technol.* **B 13**, 258 (1995).
24. S. C. Deshmukh and E. S. Aydil, "Investigation of  $\text{SiO}_2$  Plasma Enhanced Chemical Vapor Deposition through Tetraethoxysilane Using Attenuated Total Reflection Fourier Transform Infrared Spectroscopy," *J. Vac. Sci. Technol. A* **13**, 2355-2367 (1995).
25. E. S. Aydil, "In Situ Real Time Diagnostics of Surfaces: A Review " *Proceedings of the Symposium on Process Control Diagnostics and Modeling in Semiconductor Manufacturing*, Electrochemical Society Softbound Series **PV 95-2**, p. 76 (1995).
26. E. S. Aydil and S. M. Han, "Progress in In Situ Monitoring of Surfaces During Plasma Processing," *Proceedings of the 7th International Symposium on Laser-Aided Plasma Diagnostics*, Fukuoka, Japan, 172 (1995).
27. S. C. Deshmukh and E. S. Aydil, "An Investigation of Low Temperature  $\text{SiO}_2$  Plasma Enhanced Chemical Vapor Deposition," *J. Vac. Sci. Technol.* **B 14**, 738 (1996).
28. S. M. Han and E. S. Aydil, "Study of Surface Reactions During Plasma Enhanced Chemical Vapor Deposition of  $\text{SiO}_2$  from  $\text{SiH}_4$ ,  $\text{O}_2$  and Ar Plasma," *J. Vac. Sci. Technol. A* **14**, 2062 (1996).
29. E. Edelberg, S. Bergh, R. Naone, M. Hall, and E. S. Aydil, "Visible Luminescence from Nanocrystalline Silicon Films Produced by Plasma Enhanced Chemical Vapor Deposition," *Appl. Phys. Lett.* **68**, 1415 (1996).
30. D. Tretheway, and E. S. Aydil, "Modeling of Heat Transport and Wafer Heating Effects during Plasma Etching" *J. Electrochem. Soc.* **143**, 3674 (1996).
31. S. M. Han and E. S. Aydil, "Plasma and Surface Diagnostics During Plasma Enhanced Chemical Vapor Deposition of  $\text{SiO}_2$  from  $\text{SiH}_4/\text{O}_2/\text{Ar}$  Discharges," *Thin Solid Films* **291**, 427 (1996).
32. E. Edelberg, S. Bergh, R. Naone, M. Hall, and E. S. Aydil, "Luminescence from Plasma Deposited Silicon Films," *J. Appl. Phys.* **81**, 2410 (1997).
33. E. S. Aydil and R. A. Gottscho, "Probing Plasma/Surface Interactions," *Solid State Technology* **40** (10), 181 (October, 1997).
34. S. M. Han and E. S. Aydil, "Silanol Concentration Depth Profiling During Plasma Deposition of  $\text{SiO}_2$  using Multiple Internal Reflection Infrared Spectroscopy," *J. Electrochem. Soc.* **144**, 3963 (1997).
35. D. C. Marra and E. S. Aydil, "Effect of  $\text{H}_2$  Addition on Surface Reactions During  $\text{CF}_4/\text{H}_2$  Plasma Etching of Silicon and Silicon Dioxide Films," *J. Vac. Sci. Technol. A* **15**, 2508 (1997).
36. S. M. Han and E. S. Aydil, "Detection of Combinative Infrared Absorption Bands in Thin Silicon Dioxide Films," *Appl. Phys. Lett.* **70**, 3269 (1997).
37. E. Meeks, R. S. Larson, P. Ho, S. M. Han, E. Edelberg, E. S. Aydil, and C. Aplett, "Modeling High-Density-Plasma-Deposition of  $\text{SiO}_2$  in  $\text{SiH}_4/\text{O}_2/\text{Ar}$ ," Sandia National Laboratories Report **SAND97-8241** (1997).
38. S. M. Han and E. S. Aydil, "Structure and Chemical Composition of Fluorinated  $\text{SiO}_2$  Films Deposited Using  $\text{SiF}_4/\text{O}_2$  Plasmas," *J. Vac. Sci. Technol. A* **15**, 2893 (1997).
39. S. Ramalingam, A. Lopez, D. Maroudas and E. S. Aydil, "Computational Atomic Scale Study of the Reactivity of Molecular Fragments from  $\text{SiH}_4/\text{H}_2$  Plasma with Amorphous Silicon Surfaces," *Proceedings of the Electrochemical Society, ECS Softbound series*, **PV 97-30**, Pennington, New Jersey, 35 (1998).
40. D. C. Marra and E. S. Aydil, "Effect of  $\text{H}_2$  Addition on Surface Reactions during  $\text{CF}_4/\text{H}_2$  Plasma Etching of Silicon and Silicon Dioxide Films," *Proceedings of the Electrochemical Society, ECS Softbound series*, Pennington, New Jersey, **PV 97-30**, 12 (1998).

41. S. Ramalingam, D. Maroudas and E. S. Aydil, "Atomic Scale Analysis of the Reactivity of Radicals from Silane/Hydrogen Plasmas with Silicon Surfaces," *Materials Research Society Symposium Proceedings* **485**, 107-112 (1998).
42. E. Meeks, R. S. Larson, P. Ho, C. Apblett, S. M. Han, E. Edelberg, and E. S. Aydil, "Modeling of SiO<sub>2</sub> Deposition in High Density Plasma Reactors and Comparisons of Model Predictions with Experimental Measurements," *J. Vac. Sci. Technol. A* **16**, 544 (1998).
43. S. Ramalingam, D. Maroudas, and E. S. Aydil, "Atomistic Simulation of SiH Interactions with Silicon Surfaces During Deposition from Silane Containing Plasmas," *Appl. Phys. Lett.* **72**, 578-580 (1998).
44. S. M. Han and E. S. Aydil, "Reasons for Lower Dielectric Constant of Fluorinated Silicon Dioxide Films," *J. Appl. Phys.* **83**, 2172 (1998).
45. E. S. Aydil, B. O. M. Quiniou, J. T. C. Lee, J. A. Gregus, and R. A. Gottscho, "Incidence Angle Distributions of Ions Bombarding Grounded Surfaces in High Density Plasma Reactors," *Materials Science in Semiconductor Processing* **1**, 75 (1998).
46. D. C. Marra, E. A. Edelberg, R. L. Naone, and E. S. Aydil, "Effect of H<sub>2</sub> Dilution on the Surface Composition of Plasma-Deposited Silicon Films from SiH<sub>4</sub>," *Appl. Surf. Sci.* **133**, 148-151 (1998).
47. S. Ramalingam, D. Maroudas, and E. S. Aydil, "Atomic-Scale Analysis of Plasma Enhanced Chemical Vapor Deposition From SiH<sub>4</sub>/H<sub>2</sub> Plasmas on Si Substrates," *Materials Research Society Symposium Proceedings*, **507**, 673-678 (1998).
48. B. F. Hanyaloglu and E. S. Aydil, "Low temperature Plasma Deposition of Silicon Nitride from Silane and Nitrogen Plasmas," *J. Vac. Sci. Technol. A* **16**, 2794 (1998).
49. S. Ramalingam, D. Maroudas, and E. S. Aydil, "Interaction of SiH Radicals with Silicon Surfaces: An Atomic Scale Simulation Study," *J. Appl. Phys.* **84**, 3895-3911 (1998).
50. D. C. Marra, E. A. Edelberg, R. L. Naone, and E. S. Aydil, "Silicon Hydride Composition of Plasma-Deposited Hydrogenated Amorphous and Nanocrystalline Silicon Films and Surfaces," *J. Vac. Sci. Technol. A* **16**, 3199-3210 (1998).
51. S. Ramalingam, D. Maroudas, E. S. Aydil, and S. P. Walch, "Abstraction of Hydrogen by SiH<sub>3</sub> from Hydrogen Terminated Si(001)-(2x1) Surfaces," *Surface Science Letters* **418**, L8-L13 (1998).
52. S. J. Joo, S. H. Lim, E. Yoon, W. C. Choi, E. E. Kim, D. C. Marra, and E. S. Aydil, "Visible Photoluminescence at Room Temperature from a-Si:H Films grown by Ultrahigh Vacuum Electron Cyclotron Resonance Chemical Vapor Deposition," *Journal of the Korean Physical Society* **35**, S1025 (1998).
53. S. Ramalingam, D. Maroudas, and E. S. Aydil, "Visualizing Radical-Surface Interactions in Plasma Deposition Processes: Reactivity of SiH<sub>3</sub> Radicals with Si Surfaces," *IEEE Transactions on Plasma Science* **27**, 104-105 (1999).
54. E. A. Edelberg, A. Perry, N. Benjamin, and E. S. Aydil, "Energy Distribution of Ions Bombarding Biased Electrodes in High Density Plasma Reactors," *J. Vac. Sci. Technol. A* **17**, 506-516 (1999).
55. B. F. Hanyaloglu, A. Aydinli, M. Oye, and E. S. Aydil, "Plasma Enhanced Chemical Vapor Deposition of Low Dielectric Constant Parylene-F Intermetal Dielectric Films," *Appl. Phys. Lett.* **74**, 606 (1999).
56. N. A. Alcantar, E. S. Aydil, and J. Israelachvili. "Effect of Water Plasma on Silica Surfaces: Synthesis, Characterization and Applications," in *Fundamental and Applied Aspects of Chemically Modified Surfaces*, edited by J. Blitz and C. Little, The Royal Society of Chemistry (1999).
57. S. Ramalingam, D. Maroudas, and E. S. Aydil, "Atomistic Simulation Study of the Interactions of SiH<sub>3</sub> Radicals with Silicon Surfaces," *J. Appl. Phys.* **86**, 2872-2888 (1999).
58. E. A. Edelberg, A. J. Perry, N. Benjamin, and E. S. Aydil, "Compact Floating Ion Energy Analyzer for Measuring Distributions of Ions Bombarding Radio-Frequency Biased Electrode Surfaces," *Rev. Sci. Instrum.* **70**, 2689 (1999).

59. D. Maroudas, S. Ramalingam, and E. S. Aydil, "Atomic-Scale Modeling of Plasma-Surface Interactions in the PECVD of Silicon," Proceedings of the Electrochemical Society, ECS Softbound series, **PV 98-23**, Pennington, New Jersey, p. 179-190 (1999).
60. E. A. Edelberg and E. S. Aydil, "Modeling of the Sheath and the Energy Distribution of Ions Bombarding rf-Biased Substrates in High Density Plasma Reactors and Comparison to Experimental Measurements," *J. Appl. Phys.* **86**, 4799-4812 (1999).
61. S. Ramalingam, P. Mahalingam, E. S. Aydil, and D. Maroudas, "Theoretical Study of the Interactions of SiH<sub>2</sub> Radicals with Silicon Surfaces," *J. Appl. Phys.* **86**, 5497-5508 (1999).
62. N. A. Alcantar, E. S. Aydil, J. N. Israelachvili, "Polyethylene Glycol Coated Biocompatible Surfaces," *J. Biomed. Mater. Res.* **51**, 343 (2000).
63. S. Sriraman, S. Ramalingam, E. S. Aydil, and D. Maroudas, "Abstraction of Hydrogen by SiH Radicals from Hydrogenated Amorphous Silicon Surfaces," *Surf. Sci. Lett.* **459**, L475-L481 (2000).
64. D. C. Marra, E. S. Aydil, S. J. Joo, E. Yoon, and V. I. Srdanov, "Angle-Dependent Photoluminescence Spectra of Hydrogenated Amorphous Silicon Thin Films," *Appl. Phys. Lett.* **77**, 3346 (2000).
65. S. P. Walch, S. Ramalingam, E. S. Aydil, and D. Maroudas, "Mechanism and Energetics of Dissociative Adsorption of SiH<sub>3</sub> on the Hydrogen Terminated Si (001)-(2×1) Surface," *Chemical Physics Letters* **329**, 304-310 (2000).
66. W. M. M. Kessels, A. H. M. Smets, D. C. Marra, E. S. Aydil, D. C. Schram, and M. C. M. van de Sanden, "On the Growth Mechanism of a-Si:H," *Thin Solid Films* **383**, 154-160 (2001).
67. S. Ramalingam, S. Sriraman, E. S. Aydil, and D. Maroudas, "Evolution, Structure, Morphology and Reactivity of Hydrogenated Amorphous Silicon Surfaces Grown by Molecular-Dynamics Simulation," *Appl. Phys. Lett.* **78**, 2685-2687 (2001).
68. A. R. Godfrey, S. J. Ullal, L. B. Braly, E. A. Edelberg, V. Vahedi, and E. S. Aydil, "A New Diagnostic Method for Monitoring Plasma Reactor Walls: Multiple Total Internal Reflection Fourier Transform Infrared Surface Probe," *Rev. Sci. Instrum.* **72**, 3260 (2001).
69. S. P. Walch, S. Ramalingam, S. Sriraman, E. S. Aydil, and D. Maroudas, "Mechanism and Energetics of SiH<sub>3</sub> Adsorption on the Pristine Si(001)-(2×1) Surface," *Chem. Phys. Lett.* **344**, 249-255 (2001).
70. D. Y. Takamoto, E. S. Aydil, J. A. Zasadzinski, A. T. Ivanova, D. K. Schwartz, T. Yang, and P. S. Cremer, "Stable Ordering in Langmuir Blodgett Films," *Science* **293**, 1292 (2001).
71. E. S. Aydil, D. Maroudas, D. C. Marra, W. M.M. Kessels, S. Agarwal, S. Ramalingam, S. Sriraman, M. C. M. Van de Sanden, and A. Takano, "In Situ Probing and Atomistic Simulation of a-Si:H Plasma Deposition," *Materials Research Society Symposium Proceedings* **664**, A1.1.1 (2001).
72. S. Ramalingam, E. S. Aydil, and D. Maroudas, "Molecular Dynamics Study of the Interactions of Small Thermal and Energetic Clusters with Crystalline and Amorphous Silicon Surfaces," *J. Vac. Sci. Technol. B* **19**, 634-644 (2001).
73. W. M. M. Kessels, D. C. Marra, M. C. M. Van de Sanden, and E. S. Aydil, "In Situ Probing of Surface Hydrides on Hydrogenated Amorphous Silicon Using Attenuated Total Reflection Infrared Spectroscopy," *J. Vac. Sci. Technol. A* **20**, 781-789 (2002).
74. S. J. Ullal, A. R. Godfrey, E. A. Edelberg, L. B. Braly, V. Vahedi, and E. S. Aydil, "Effect of Chamber Wall Conditions on Cl and Cl<sub>2</sub> Concentrations in an Inductively Coupled Plasma reactor," *J. Vac. Sci. Technol. A* **20**, 43 (2002).
75. S. Sriraman, E. S. Aydil and D. Maroudas, "Visualizing the Evolution of Surface Bond Straining During Radical-Surface Interactions in Plasma Deposition Processes," *IEEE Transactions on Plasma Science* **30**, 112-113 (2002).
76. T. W. Kim and E. S. Aydil, "Spatial and Temporal Variation of the Ion Flux Impinging on the Wafer Surface in Presence of a Plasma Instability," *IEEE Transactions on Plasma Science* **30**, 120 (2002).

77. S. J. Ullal, H. Singh, J. Daugherty, V. Vahedi, and E. S. Aydil, "Maintaining Reproducible Plasma Reactor Wall Conditions: SF<sub>6</sub> Plasma Cleaning of Films Deposited on Chamber Walls During Cl<sub>2</sub>/O<sub>2</sub> Plasma Etching of Si," *J. Vac. Sci. Technol. A* **20**, 1195 (2002).
78. S. J. Ullal, H. Singh, V. Vahedi, and E. S. Aydil, "Deposition of Silicon Oxychloride Films on Chamber Walls During Cl<sub>2</sub>/O<sub>2</sub> Plasma Etching of Si," *J. Vac. Sci. Technol. A* **20**, 499 (2002).
79. S. Agarwal, S. Sriraman, E. S. Aydil, and D. Maroudas, "Mechanism and Activation Energy Barrier for H Abstraction by H(D) from a-Si:H Surfaces," *Surface Science* **515**, L469-L474 (2002).
80. S. Sriraman, S. Agarwal, E. S. Aydil, and D. Maroudas, "Mechanism of Hydrogen Induced Crystallization of Amorphous Silicon," *Nature* **418**, 62-65 (2002).
81. T. W. Kim, S. J. Ullal, V. Vahedi, and E. S. Aydil, "An On-Wafer Probe Array for Measuring Two-Dimensional Ion Flux Distributions in Plasma Reactors," *Rev. Sci. Instrum.* **73**, 3494 (2002).
82. S. Sriraman, E. S. Aydil, and D. Maroudas, "Atomic-Scale Analysis of Deposition and Characterization of a-Si:H Thin Films Grown from SiH Radical Precursor," *J. Appl. Phys.* **92**, 842-852 (2002).
83. S. J. Ullal, H. Singh, J. Daugherty, V. Vahedi, E. S. Aydil, "Formation and Removal of Composite Halogenated Silicon Oxide and Fluorocarbon Films Deposited on Chamber Walls During Plasma Etching of Multiple Film Stacks," *J. Vac. Sci. Technol. B* **20**, 1939 (2002).
84. S. Agarwal, A. Takano, M. C. M. Van de Sanden, D. Maroudas, and E. S. Aydil, "Abstraction of Atomic Hydrogen by Atomic Deuterium from an Amorphous Hydrogenated Silicon Surface," *J. Chem. Phys.* **117**, 10805-10816 (2002).
85. T. W. Kim and E. S. Aydil, "Two Dimensional Ion Flux Distributions in Inductively coupled Plasmas: Effect of Adding Electronegative Gases to Ar," *J. Appl. Phys.* **92**, 6444 (2002).
86. A. Takano and E. S. Aydil, "Incorporation of Cl into Hydrogenated Amorphous Silicon without Optical Band Gap Widening," *Jpn. J. Appl. Phys.* **41**, L1357 (2002).
87. S. J. Ullal, T. W. Kim, V. Vahedi, and E. S. Aydil, "Relation Between the Ion Flux, Gas Phase Composition, and Wall Conditions in Chlorine Plasma Etching of Silicon," *J. Vac. Sci. Technol. A* **21**, 589 (2003).
88. D. C. Marra, W. M. M. Kessels, M. C. M. Van de Sanden, K. Kashefzadeh, and E. S. Aydil, "Surface Hydride Composition of Plasma Deposited Hydrogenated Amorphous Silicon: In Situ Infrared Study of Ion Flux and Temperature Dependence," *Surf. Sci.* **530**, 1-16 (2003).
89. T. W. Kim and E. S. Aydil, "Effects of Chamber Wall Conditions on Cl Concentration and Si Etch rate Uniformity in Plasma Etching Reactors," *J. Electrochem. Soc.* **150**, 418 (2003).
90. T. W. Kim and E. S. Aydil, "Spatial and Temporal Variation of Ion Flux in Presence of an Instability in Inductively Coupled SF<sub>6</sub> Plasmas," *Plasma Sources Sci. T.* **12**, 148 (2003).
91. T. W. Kim and E. S. Aydil, "Experimental and Theoretical Study of Two-Dimensional Ion Flux Uniformity at the Wafer Plane in Inductively Coupled Plasmas," *IEEE T. Plasma Sci.* **31**, 614 (2003).
92. S. Sriraman, P. Mahalingam, E. S. Aydil, D. Maroudas, "Mechanism and Energetics of Dimerization of SiH<sub>2</sub> Radicals on H-Terminated Si (001)-(2×1) Surfaces," *Surf. Sci. Lett.* **540**, L623-L630 (2003).
93. J. B. Baxter, R. E. M. W. Bessems, and E. S. Aydil, "Growth and Characterization of ZnO Nanowires," *Materials Research Society Symposium Proceedings* **776**, Q7.9, 101-106 (2003).
94. S. Agarwal, B. Hoex, M. C. M. van de Sanden, D. Maroudas and E. S. Aydil "Absolute densities of N and Excited N<sub>2</sub> in an N<sub>2</sub> Plasma," *Appl. Phys. Lett.* **83**, 4918-4920 (2003).
95. J. B. Baxter, F. Wu, and E. S. Aydil, "Growth Mechanism and Characterization of Zinc Oxide Hexagonal Columns," *Appl. Phys. Lett.* **83**, 3797 (2003).
96. A. Takano, T. Wada, S. Fujikake, T. Yoshida, T. Ohto, and E. S. Aydil, "Reaction Control in Amorphous Silicon Film Deposition by Hydrogen Chloride," *Materials Research Society Symposium Proceedings*, A.15.2, 521-526 (2003).

97. S. Agarwal, B. Hoex, M. C. M. van de Sanden, D. Maroudas, and E. S. Aydil, "Hydrogen in Si-Si Bond-Center and Platelet-Like Configurations in Amorphous Hydrogenated Silicon," *J. Vac. Sci. Technol. B* **22**, 2719-2726 (2004).
98. S. Sriraman, E. S. Aydil, and D. Maroudas, "Growth and Characterization of a-Si:H Thin Films from SiH<sub>2</sub> Radical Precursor: An Atomic Scale Analysis," *J. Appl. Phys.* **95**, 1792-1805 (2004).
99. S. Agarwal, G. W. W. Quax, M. C. M. van de Sanden, D. Maroudas and E. S. Aydil, "Measurement of Absolute Radical Densities in a Plasma Using Modulated Beam Line-of-Sight Threshold Ionization Mass Spectrometry," *J. Vac. Sci. Technol. A* **22**, 71-81 (2004).
100. S. Gomez, J. R. Belen, M. Kiehlbauch, and E. S. Aydil, "Etching of High Aspect Ratio Structures in Si Using SF<sub>6</sub>/O<sub>2</sub> Plasma," *J. Vac. Sci. Technol. A* **22**, 606 (2004).
101. E. S. Aydil, S. Agarwal, M. Valipa, S. Sriraman, and D. Maroudas, "Surface Processes during Growth of Hydrogenated Amorphous Silicon," *Materials Research Society Symposium Proceedings* **808**, A 5.5 (2004).
102. R. J. Belen, S. Gomez, M. Kiehlbauch, D. Cooperberg and E. S. Aydil, "Feature-Scale Model of Si Etching in SF<sub>6</sub> Plasma and Comparison with Experiments," *J. Vac. Sci. Technol. A* **23**, 99 (2005).
103. M. S. Valipa, E. S. Aydil, and D. Maroudas, "Atomistic Calculation of the SiH<sub>3</sub> Surface Reactivity During Plasma Deposition of Amorphous Silicon Thin Films," *Surf. Sci. Lett.* **572**, L339-L347 (2005).
104. J. B. Baxter and E. S. Aydil, "Epitaxial Growth of ZnO Nanowires on a- and c-plane Sapphire," *Journal of Crystal Growth* **274**, 407 (2005).
105. C. A. Wolden, T. M. Barnes, J. B. Baxter, and E. S. Aydil, "Infrared detection of Hydrogen-Generated Free Carriers in Polycrystalline ZnO Thin Films," *J. Appl. Phys.* **97**, 043522 (2005).
106. J. B. Baxter and E. S. Aydil, "Nanowire-Based Dye-Sensitized Solar Cells," *Appl. Phys. Lett.* **86**, 053114 (2005).
107. M. Valipa, E. S. Aydil, and D. Maroudas, "Visualizing the Evolution of Surface Morphology and Surface Bond Strain During Plasma Deposition of Amorphous Silicon Thin Films," *IEEE T. Plasma Sci.* **33**, 228-229 (2005).
108. J. R. Belen, S. Gomez, D. Cooperberg, M. Kiehlbauch and E. S. Aydil, "Feature-Scale Model of Si Etching in SF<sub>6</sub>/O<sub>2</sub> Plasma and Comparison with Experiments," *J. Vac. Sci. Technol. A* **23**, 1430-1439 (2005).
109. T. Bakos, M. Valipa, E. S. Aydil, and D. Maroudas, "Temperature Dependence of Precursor-Surface Interactions in Plasma Deposition of Silicon Thin Films," *Chem. Phys. Lett.* **414**, 61-65 (2005).
110. S. Gomez, J. R. Belen, M. Kiehlbauch, and E. S. Aydil, "Etching of High Aspect Ratio Features in Si using SF<sub>6</sub>/O<sub>2</sub>/HBr and SF<sub>6</sub>/O<sub>2</sub>/Cl<sub>2</sub> Plasma," *J. Vac. Sci. Technol. A* **23**, 1592 (2005).
111. M. S. Valipa, T. Bakos, E. S. Aydil, and D. Maroudas, "Surface Smoothing Mechanism of Amorphous Silicon Thin Films," *Phys. Rev. Lett.* **95**, 216102 (2005).
112. S. Agarwal, M. S. Valipa, B. Hoex, M. C. M. van de Sanden, D. Maroudas and E. S. Aydil, "Interaction of SiH<sub>3</sub> Radicals with an Amorphous Deuterated (Hydrogenated) Silicon Surface," *Surf. Sci.* **598**, 35-44 (2005).
113. M. S. Valipa, S. Sriraman, E. S. Aydil, and D. Maroudas, "Atomic-Scale Analysis of Fundamental Mechanisms of Surface Valley Filling During Plasma Deposition of Amorphous Silicon Thin Films," *Surf. Sci.* **574**, 123-143 (2005).
114. M. Valipa, T. Bakos, E. S. Aydil and D. Maroudas, "The Role of SiH<sub>3</sub> Diffusion in Determining the Surface Smoothness of Plasma-Deposited Amorphous Silicon Thin Films: An atomic scale analysis," *Materials Research Society Symposium Proceedings* **862**, A3.2 (2005).
115. J. B. Baxter and E. S. Aydil, "Dye Sensitized Solar Cells Based on Semiconductor Morphologies with ZnO Nanowires," *Sol. Energ. Mat. Sol. C.* **90**, 607 (2006).
116. J. R. Belen, S. Gomez, M. Kiehlbauch and E. S. Aydil, "Feature-scale Model of Si etching in SF<sub>6</sub>/O<sub>2</sub>/HBr Plasma and Comparison with Experiments," *J. Vac. Sci. Technol. A* **24**, 350 (2006).



117. J. B. Baxter, A. M. Walker, K. van Ommering, and E. S. Aydil, "Synthesis and Characterization of ZnO Nanowires and their Integration into Dye Sensitized Solar Cells," *Nanotechnology* **17**, S304 (2006).
118. S. Sriraman, M. S. Valipa, E. S. Aydil, and D. Maroudas, "Hydrogen-Induced Crystallization of Amorphous Silicon Thin Films. I. Simulation and Analysis of Film Post Growth Treatment with H<sub>2</sub> Plasmas," *J. Appl. Phys.* **100**, 053514 (2006).
119. M. S. Valipa, S. Sriraman, E. S. Aydil, and D. Maroudas, "Hydrogen-Induced Crystallization of Amorphous Silicon Thin Films. II. Mechanisms and Energetics of Hydrogen Insertion into Si-Si Bonds," *J. Appl. Phys.* **100**, 053515 (2006).
120. J. R. Belen, S. Gomez, M. Kiehlbauch and E. S. Aydil, "In Situ Measurement of the Ion Incidence Angle Dependence of the Ion-Enhanced Etching Yield in Plasma Reactors," *J. Vac. Sci. Technol. A* **24**, 2176-2186 (2006).
121. K. S. Leschkies, R. Divakar, J. Basu, E. Enache-Pommer, J. E. Boercker, C. B. Carter, U. R. Kortshagen, D. J. Norris, and E. S. Aydil, "Photosensitization of ZnO Nanowires with CdSe Quantum Dots for Photovoltaic Devices," *Nano Lett.* **7**, 1793-1798 (2007).
122. E. Enache-Pommer, J. E. Boercker and E. S. Aydil, "Electron Transport and Recombination in Polycrystalline TiO<sub>2</sub> Nanowire Dye-Sensitized Solar Cells," *Appl. Phys. Lett.* **91**, 123116 (2007).
123. R. C. Mani, I. Pavel, and E. S. Aydil, "Deposition of Nanocrystalline Silicon Films at Room Temperature," *J. Appl. Phys.* **102**, 043305 (2007).
124. E. S. Aydil, "Nanomaterials for Solar Cells," *Nanotechnology Law & Business* **4**, 275-291 (2007).
125. J. E. Boercker, E. Enache-Pommer, and E. S. Aydil, "Growth Mechanism of TiO<sub>2</sub> Nanowires for Dye-Sensitized Solar Cells," *Nanotechnology* **19**, 095604 (2008).
126. B. Carlson, K. S. Leschkies, E. S. Aydil and X.-Y. Zhu, "Valence Band Alignment at CdSe Quantum Dot and ZnO (10 $\bar{1}0$ ) Interfaces," *J. Phys. Chem. C* **112**, 8419-8423 (2008).
127. W. A. Tisdale, M. Muntwiler, D. J. Norris, E. S. Aydil and X.-Y. Zhu, "Electron Dynamics at the (10 $\bar{1}0$ ) ZnO Surface," *J. Phys. Chem. C* **112**, 14682-14692 (2008).
128. B. Liu, J. E. Boercker, and E. S. Aydil, "Oriented Single-Crystalline Anatase TiO<sub>2</sub> Nanowires," *Nanotechnology* **19**, 505604 (2008).
129. J. B. Baxter and E. S. Aydil, "Metalorganic Chemical Vapor Deposition of ZnO Nanowires from Zinc Acetylacetonate and oxygen," *J. Electrochem. Soc.* **156**, H52-H58 (2009).
130. B. Liu and E. S. Aydil, "Growth of Oriented Single-Crystalline Rutile TiO<sub>2</sub> Nanorods on Transparent Conducting Substrates for Dye-Sensitized Solar Cells," *J. Am. Chem. Soc.* **131**, 3985-3990 (2009).
131. J. E. Boercker, J. B. Schmidt and E. S. Aydil, "Transport Limited Growth of Zinc Oxide Nanowires," *Cryst. Growth Des.* **9**, 2783-2789 (2009).
132. T. Singh, M. J. Behr, E. S. Aydil and D. Maroudas, "First-Principles Theoretical Analysis of Pure and Hydrogenated Crystalline Carbon Phases and Nanostructures," *Chem. Phys. Lett.* **474**, 168-174 (2009).
133. K. J. Williams, W. A. Tisdale, K. S. Leschkies, G. Haugstad, D. J. Norris, E. S. Aydil and X.-Y. Zhu, "Strong Electronic Coupling in Two-Dimensional Assemblies of Colloidal PbSe Quantum Dots," *ACS Nano* **3**, 1532-1538 (2009).
134. S. Jeong and E. S. Aydil, "Heteroepitaxial Growth of Cu<sub>2</sub>O Thin Film on ZnO by Metal Organic Chemical Vapor Deposition," *J. Cryst. Growth* **311**, 4188-4192 (2009).
135. E. Enache-Pommer, B. Liu and E. S. Aydil, "Electron Transport and Recombination in Dye-Sensitized Solar Cells Made from Single Crystal Rutile TiO<sub>2</sub> Nanowires," *Phys. Chem. Chem. Phys.* **11**, 9648-9652 (2009).
136. A. R. Muniz, T. Singh, E. S. Aydil, and D. Maroudas, "Analysis of Diamond Nanocrystal Formation from Multi-walled Carbon Nanotubes," *Phys. Rev. B* **80**, 144105 (2009).

137. K. S. Leschkies, T. J. Beatty, M. S. Kang, D. J. Norris, and E. S. Aydil, "Solar Cells Based on Junctions Between Colloidal PbSe Nanocrystals and Thin ZnO Films," *ACS Nano* **11**, 3638-3648 (2009).
138. K. S. Leschkies, A. G. Jacobs, D. J. Norris, and E. S. Aydil, "Nanowire-Quantum-Dot Solar Cells and the Influence of Nanowire Length on the Charge Collection Efficiency," *Appl. Phys. Lett.* **95**, 193103 (2009).
139. K. S. Leschkies, M. S. Kang, E. S. Aydil and D. J. Norris, "Influence of Atmospheric Gases on the Electrical Properties of PbSe Quantum-Dot Films," *J. Phys. Chem. C* **114**, 9988-9996 (2010).
140. W. A. Tisdale, K. J. Williams, B. C. Timp, D. J. Norris, E. S. Aydil and X.-Y. Zhu, "Hot Electron Transfer from Semiconductor Nanocrystals," *Science* **328**, 1543-1547 (2010).
141. B. Liu, D. Deng, J. Y. Lee and E. S. Aydil, "Oriented Single-Crystalline TiO<sub>2</sub> Nanowires on Titanium Foil for Lithium Ion Batteries," *J. Mater. Res.* **25**, 1588-1594 (2010). <https://dx.doi.org/10.1557/jmr.2010.0204>
142. M. J. Behr, A. K. Mkhoyan and E. S. Aydil, "Catalyst Rotation, Twisting, and Bending During Multiwall Carbon Nanotube Growth," *Carbon* **48**, 3840-3845 (2010).
143. M. J. Behr, E. A. Gaulding, A. K. Mkhoyan and E. S. Aydil, "Effect of Hydrogen on Catalyst Nanoparticles in Carbon Nanotube Growth," *J. Appl. Phys.* **108**, 053303 (2010).
144. M. J. Behr, A. K. Mkhoyan and E. S. Aydil, "Orientation and Morphological Evolution of Catalyst Nanoparticles During Carbon Nanotube Growth," *ACS Nano* **4**, 5087-5094 (2010).
145. S. Jeong and E. S. Aydil, "Structural and Electrical Properties of Cu<sub>2</sub>O Thin Films Deposited on ZnO by Metal Organic Chemical Vapor Deposition," *J. Vac. Sci. Technol. A* **28**, 1338-1343 (2010).
146. M. J. Behr, E. A. Gaulding, A. K. Mkhoyan and E. S. Aydil, "Hydrogen Etching and Cutting of Multiwall Carbon Nanotubes," *J. Vac. Sci. Technol. B* **28** 1187-1194 (2010).
147. N. Araki, E. S. Aydil and K. Dorfman, "Collision of a Long DNA molecule with an Isolated Nanowire," *Electrophoresis* **31**, 3675-3680 (2010).
148. A.-J. Cheng, M. Manno, R. Frakie, R. Hoffman, C. Leighton, E. S. Aydil, S. A. Campbell, "Sulfurization studies of the potential thin film solar absorber Cu<sub>2</sub>ZnSnS<sub>4</sub>," *Photovoltaics Specialist Conference (PVSC) 2010 35<sup>th</sup> IEEE*, 001906 (2010).
149. S. H. Song, K. Nagaich, E. S. Aydil, R. Feist, R. Haley and S. A. Campbell, "Structure Optimization for a High Efficiency CIGS Solar Cell," *Proceedings of the 35<sup>th</sup> Photovoltaics Specialist Conference (PVSC) 2010 35<sup>th</sup> IEEE*, 002488 (2010).
150. C. A. Wolden, J. Kurtin, J. B. Baxter, I. Repins, S. E. Shaheen, J. T. Torvik, A. A. Rockett, V. M. Fthenakis and E. S. Aydil, "Photovoltaic Manufacturing: Present Status, Future Prospects and Research Needs," *J. Vac. Sci. Technol. A* **29**, 030801 (2011). <https://dx.doi.org/0.1116/1.3569757>
151. S. H. Jeong, S. H. Song, K. Nagaich, S. A. Campbell, E. S. Aydil, "An Analysis of Temperature Dependent Current-Voltage Characteristics of Cu<sub>2</sub>O-ZnO Heterojunction Solar Cells," *Thin Solid Films* **519**, 6613-6619 (2011).
152. M. J. Behr, K. A. Mkhoyan, and E. S. Aydil, "Carbon Diffusion from Methane into Walls of Carbon Nanotube through Structurally and Compositionally Modified Iron Catalyst," *Microscopy and Microanalysis* **17**, 582-586 (2011).
153. A.-J Cheng, M. Manno, A. Khare, C. Leighton, S. Campbell and E. S. Aydil, "Imaging and Phase Identification of Cu<sub>2</sub>ZnSnS<sub>4</sub> Thin Films Using Confocal Raman Spectroscopy," *J. Vac. Sci. Technol. A* **29**, 051203 (2011).
154. B. Liu and E. S. Aydil, "Layered Mesoporous Nanostructures for Enhanced Light Harvesting in Dye-Sensitized Solar Cells," *Journal of Renewable and Sustainable Energy* **3**, 043106 (2011).
155. B. Liu and E. S. Aydil, "Anatase TiO<sub>2</sub> Films with Reactive {001} Facets on Transparent Conductive Substrate," *Chem. Commun.* **47**, 9507-9509 (2011).
156. A. Khare, A. W. Wills, L. M. Ammerman, D. J. Norris and E. S. Aydil, "Size Control and Quantum Confinement in Cu<sub>2</sub>ZnSnS<sub>4</sub> Nanocrystals," *Chem. Commun.* **47**, 11721-11723 (2011).

157. B. Liu, A. Khare and E. S. Aydil, "TiO<sub>2</sub>-B/Anatase Core-Shell Heterojunction Nanowires for Photocatalysis," *ACS Appl. Mater. Interfaces* **3**, 4444-4450 (2011). <https://dx.doi.org/10.1021/am201123u>
158. B. S. Tosun, R. K. Feist, A. Gunawan, K. A. Mkhoyan, S. A. Campbell and E. S. Aydil, "Sputter Deposition of Semicrystalline Tin Dioxide Films," *Thin Solid Films* **520**, 2554-2561 (2012).
159. B. S. Tosun, R. K. Feist, A. Gunawan, K. A. Mkhoyan, S. A. Campbell and E. S. Aydil, "Improving the Damp-Heat Stability of Copper Indium Gallium Diselenide Solar Cells with a Semicrystalline Tin Dioxide Overlayer," *Solar Energy Materials and Solar Cells* **101**, 270-276 (2012).
160. B. S. Tosun, R. K. Feist, S. A. Campbell and E. S. Aydil, "Tin Dioxide as an Alternative Window Layer for Improving the Damp-Heat Stability of Copper indium Gallium Diselenide Solar Cells," *J. Vac. Sci. Technol. A* **30**, 04D101 (2012).
161. A. Khare, B. Himmetoglu, M. Johnson, D. J. Norris, M. Cococcioni and E. S. Aydil, "Calculation of the Lattice Dynamics and Raman Spectra of Copper Zinc Tin Chalcogenides and Comparison to Experiments," *J. Appl. Phys.* **111**, 083707 (2012).
162. A. Khare, B. Himmetoglu, M. Cococcioni and E. S. Aydil, "First Principles Calculation of the Electronic Properties and Lattice Dynamics of Cu<sub>2</sub>ZnSn(S<sub>1-x</sub>Se<sub>x</sub>)<sub>4</sub>," *J. Appl. Phys.* **111**, 123704 (2012).
163. B. S. Tosun, C. Pettit, S. A. Campbell and E. S. Aydil, "Structure and Composition of Zn<sub>x</sub>Cd<sub>1-x</sub>S Films Synthesized through Chemical Bath Deposition," *ACS Appl. Mater. Interfaces* **4**, 3676-3684 (2012).
164. B. Liu, A. Khare and E. S. Aydil, "Synthesis of Single-Crystalline Anatase Nanorods and Nanoflakes on Transparent Conducting Substrates," *Chem. Commun.* **45**, 8565-8567 (2012).
165. A. Baruth, M. Manno, D. Narasimhan, A. Shankar, X. Zhang, M. Johnson, E. S. Aydil, and C. Leighton, "Reactive Sputter Deposition of Pyrite Structure Transition Metal Disulfide Thin Films: Microstructure, Transport and Magnetism," *J. Appl. Phys.* **112**, 054328 (2012).
166. D. J. Norris and E. S. Aydil, "Getting Moore from Solar Cells," *Science* **338**, 625-626 (2012).
167. N. Rastgar, D. J. Rowe, R. J. Anthony, B. A. Merritt, U. R. Kortshagen and E. S. Aydil, "Effects of Water Adsorption and Surface Oxidation on the Electrical Conductivity of Silicon Nanocrystal Films," *J. Phys. Chem. C* **117**, 4211-4218 (2013).
168. X. Zhang, M. Manno, A. Baruth, M. Johnson, E. S. Aydil, and C. Leighton, "Crossover From Nanoscopic Intergranular Hopping to Conventional Charge Transport in Pyrite Thin Films," *ACS Nano* **7**, 2781-2789 (2013).
169. B. S. Tosun, B. D. Chernomordik, A. A. Gunawan, B. Williams, K. A. Mkhoyan, L. F. Francis and E. S. Aydil, "Cu<sub>2</sub>ZnSnS<sub>4</sub> Nanocrystal Dispersions in Polar Liquids," *Chem. Comm.* **49**, 3549-3551 (2013). <https://dx.doi.org/10.1039/C3CC40388B>
170. T. J. Pundsack, B. D. Chernomordik, A. E. Béland, E. S. Aydil, and D. A. Blank, "Excited State Dynamics in CZTS Nanocrystals," *J. Phys. Chem. Lett.* **4**, 2711-2714 (2013).
171. B. S. Tosun, J. T. Abrahamson, C. Cheng, S. A. Campbell and E. S. Aydil, "Efficient Continuous Flow Chemical Bath Deposition of CdS Films as Buffer Layers for Chalcogenide-Based Solar Cells," *39<sup>th</sup> IEEE Photovoltaics Specialist Conference (PVSC) 2013*, 1192-1194 (2013).
172. N. J. Kramer, R. J. Anthony, M. Mamunuru, E. S. Aydil and U. R. Kortshagen, "Plasma Induced Crystallization of Silicon Nanoparticles," *J. Phys. D* **47**, 075202 (2014).
173. B. Liu, L. Liu, X-F. Lang, H.-Y. Wang, X. W. Lou and E. S. Aydil, "Doping High-Surface-Area Mesoporous TiO<sub>2</sub> Microspheres with Carbonate for Visible Light Hydrogen Production," *Energy Environ. Sci.* **7**, 2592-2597 (2014). <https://dx.doi.org/10.1039/C4EE00472H>
174. M. Johnson, S. V. Baryshev, E. Thimsen, M. Manno, X. Zhang, I. V. Veryovkin, C. Leighton and E. S. Aydil, "Alkali-metal-enhanced grain growth in Cu<sub>2</sub>ZnSnS<sub>4</sub> thin films," *Energy Environ. Sci.* **7**, 1931-1938 (2014).

175. T. R. Knutson, P. J. Hanson, E. S. Aydil and R. L. Penn, "Synthesis of  $\text{Cu}_2\text{ZnSnS}_4$  Thin Films Directly onto Conductive Substrates via Selective Thermolysis using Microwave Energy" *Chem. Comm.* **50**, 5902-5904 (2014).
176. A. A. Gunawan, B. D. Chernomordik, D. S. Plemmons, D. D. Deng, E. S. Aydil, and K. A. Mkhoyan "Plasmonic Interactions through Chemical Bonds of Surface Ligands on PbSe Nanocrystals," *Chem. Mater.* **26**, 3328-3333 (2014).
177. B. D. Chernomordik, A. E. Béland, D. D. Deng, L. F. Francis, and E. S. Aydil, "Microstructure Evolution and Crystal Growth in  $\text{Cu}_2\text{ZnSnS}_4$  Thin Films Formed By Annealing Colloidal Nanocrystal Coatings," *Chem. Mater.* **26**, 3191–3201 (2014).
178. B. D. Chernomordik, A. E. Béland, N. Trejo, A. Gunawan, D. D. Deng, K. A. Mkhoyan and E. S. Aydil "Rapid Facile Synthesis of  $\text{Cu}_2\text{ZnSnS}_4$  Nanocrystals," *J. Mater. Chem. A* **2**, 10389–10395 (2014).
179. E. Thimsen, U. R. Kortshagen and E. S. Aydil, "Plasma Synthesis of Stoichiometric  $\text{Cu}_2\text{S}$  nanocrystals Stabilized by Oleylamine," *Chem. Comm.* **50**, 8346-8349 (2014).
180. S. Karthikeyan, M. Sibakotil, R. Liptakl, S. H. Song, J. Abrahamson, E. S. Aydil and S. A. Campbell, "Challenges in Deposition of Wide Band Gap Copper Indium Aluminum Gallium Selenide (CIAGS) Thin Films for Tandem Solar Cells," *40<sup>th</sup> IEEE Photovoltaics Specialist Conference (PVSC) 2014*, 1632-11634 (2014).
181. M. Johnson, M. Manno, X. Zhang, C. Leighton, and E. S. Aydil, "Substrate and Temperature Dependence of the formation of the Earth Abundant Solar Absorber  $\text{Cu}_2\text{ZnSnS}_4$  by *ex situ* Sulfidation of Co-sputtered Cu-Zn-Sn Films," *J. Vac. Sci. Technol. A* **32**, 061203 (2014).
182. E. Thimsen, M. Johnson, X. Zhang, A. J. Wagner, K. A. Mkhoyan, U. Kortshagen and E. S. Aydil, "High Electron Mobility Thin Films Formed Via Supersonic Impact Deposition of Nanocrystals Synthesized in Nonthermal Plasmas," *Nat. Comm.* **5**, 5822 (2014).
183. F. Johnson, S. H. Song, J. Abrahamson, R. Liptak, E. S. Aydil and S. Campbell, "Sputtered Metal Oxide Broken Gap Junctions for Solar Cells," *Sol. Energy Mater. Sol. Cells* **132**, 515-522 (2015).
184. S. H. Song, E. S. Aydil and S. Campbell, "Metal Oxide Broken Gap Tunnel Junction for Copper Indium Gallium Diselenide Tandem Solar Cells," *Sol. Energy Mater. Sol. Cells* **133**, 133-142 (2015).
185. N. J. Kramer, E. S. Aydil and U. R. Kortshagen, "Requirements for Plasma Synthesis of Nanocrystals at Atmospheric Pressures," *J. Phys. D* **48**, 035205 (2015).
186. N. Bilik, R. Anthony, B. Merritt, E. S. Aydil and U. Kortshagen, "Langmuir Probe Measurements of Electron Energy Probability Functions in Dusty Plasmas," *J. Phys. D* **48**, 105204 (2015).
187. M. Johnson, C. Wrasman, X. Zhang, M. Manno, C. Leighton and E. S. Aydil, "Self-Regulation of Cu/Sn Ratio in the Synthesis of  $\text{Cu}_2\text{ZnSnS}_4$  Films," *Chem. Mater.* **27**, 2507-2514 (2015).
188. B. A. Williams, A. Mahajan, M. A. Smeaton, C. S. Holgate, E. S. Aydil, L. F. Francis, "Formation of Copper Zinc Tin Sulfide Thin Films from Colloidal Nanocrystal Dispersions via Aerosol-Jet Printing and Compaction," *ACS Appl. Mater. Interfaces* **7**, 11526–11535 (2015).
189. E. Thimsen, U. R. Kortshagen and E. S. Aydil, "Nonthermal Plasma Synthesis of Metal Sulfide Nanocrystals from Metalorganic Vapor and Elemental Sulfur," *J. Phys. D* **48**, 31404 (2015).
190. X. Zhang, T. Scott, T. Socha, D. Nielsen, M. Manno, M. Johnson, Y. Yan, Y. Losovyj, P. Dowben, E. S. Aydil, and C. Leighton, "Phase Stability and Stoichiometry in Thin Film Iron Pyrite: Impact on Electronic Transport Properties," *ACS Appl. Mater. Interfaces* **7**, 14130–14139 (2015).
191. B. L. Greenberg, S. Ganguly, J. T. Held, N. J. Kramer, K. A. Mkhoyan, E. S. Aydil and U. R. Kortshagen, "Nonequilibrium-Plasma-Synthesized ZnO Nanocrystals with Plasmon Resonance Tunable via Al Doping and Quantum Confinement," *Nano Lett.* **15**, 8162-8169 (2015).
192. Y. Qin, N. Bilik, U. R. Kortshagen and E. S. Aydil, "Laser light scattering from silicon particles generated in an argon diluted silane plasma," *J. Phys. D* **49**, 085203 (2016).

193. B. D. Chernomordik, P. M. Ketkar, A. K. Hunter, A. E. Béland, D. D. Deng, and E. S. Aydil, "Microstructure Evolution During Selenization of  $\text{Cu}_2\text{ZnSnS}_4$  Colloidal Nanocrystal Coatings," *Chem. Mater.* **28**, 1266-1276 (2016).
194. N. Bilik, B. L. Greenberg, J. Yang, E. S. Aydil, and U. R. Kortshagen, "Atmospheric-Pressure Glow Plasma Synthesis of Plasmonic and Photoluminescent Zinc Oxide Nanocrystals," *J. Appl. Phys.* **119**, 243302 (2016).
195. A. H. Pinto, S. W. Shin, E. S. Aydil and R. L. Penn, "Selective Removal of  $\text{Cu}_{2-x}(\text{S},\text{Se})$  Phases from  $\text{Cu}_2\text{ZnSn}(\text{S},\text{Se})_4$  Thin Films," *Green Chemistry* **18**, 5814-5821 (2016).
196. U. R. Kortshagen, R. M. Sankaran, R. N. Pereira, S. L. Girshick, J. J. Wu and E. S. Aydil, "Nonthermal Plasma Synthesis of Nanocrystals: Fundamental Principles, Materials, and Applications," *Chem. Rev.* **116**, 11061-11127 (2016).
197. B. A. Williams, M. A. Smeaton, C. S. Holgate, N. D. Trejo, L. F. Francis, and E. S. Aydil, "Intense Pulsed Light Annealing of Copper Zinc Tin Sulfide Nanocrystal Coatings," *J. Vac. Sci. Technol. A* **34**, 151204 (2016).
198. B. A. Williams, M. A. Smeaton, N. D. Trejo, L. F. Francis, and E. S. Aydil, "Effect of Nanocrystal Size and Carbon on Grain Growth During Annealing of Copper Zinc Tin Sulfide Nanocrystal Coatings," *Chem. Mater.* **29**, 1676-1683 (2017).
199. B. A. Williams, N. D. Trejo, A. Wu, C. S. Holgate, L. F. Francis, and E. S. Aydil, "Copper Zinc Tin Sulfide Thin Films via Annealing of Ultrasonic Spray Deposited Nanocrystal Coatings" *ACS Applied Materials & Interfaces* **9**, 1886-18871 (2017).
200. X. Zhang, M. Li, J. Walter, L. O'Brien, M. Manno, B. Voigt, F. Mork, S. Baryshev, J. Kakalios, E. S. Aydil and C. Leighton, "Potential Resolution to the "Doping Puzzle" in Iron Pyrite: Carrier Type Determination by Hall Effect and Thermopower," *Phys. Rev. Materials* **1**, 015402 (2017).
201. B. L. Greenberg, Z. L. Robinson, K. V. Reich, C. Gorynski, B. N. Voigt, L. F. Francis, B. I. Shklovskii, E. S. Aydil, and U. R. Kortshagen, "ZnO Nanocrystal Networks Near the Insulator–Metal Transition: Tuning Contact Radius and Electron Density with Intense Pulsed Light," *Nano Lett.* **17**, 4634-4642 (2017).
202. W. N. Wenger, F. S. Bates, and E. S. Aydil, "Functionalization of Cadmium Selenide Quantum Dots with Poly(ethylene glycol): Ligand Exchange, Surface Coverage, and Dispersion Stability," *Langmuir* **33**, 8239-8245 (2017). <https://doi.org/10.1021/acs.langmuir.7b01924>
203. A. H. Pinto, S. W. Shin, E. Isaac, T. R. Knutson, E. S. Aydil and R. Lee Penn, "Controlling  $\text{Cu}_2\text{ZnSnS}_4$  (CZTS) Phase in Microwave Solvothermal Synthesis," *J. Mater. Chem. A* **5**, 23179-23189 (2017).
204. J. Walter, X. Zhang, B. Voigt, R. Hool, M. Manno, F. Mork, E. S. Aydil and C. Leighton, "Surface Conduction in *n*-type Pyrite  $\text{FeS}_2$  Single Crystals," *Phys. Rev. Materials* **1**, 065403 (2017).
205. A. H. Pinto, S. W. Shin, A. Sharma, R. L. Penn and E. S. Aydil, "Synthesis of  $\text{Cu}_2(\text{Zn}_{1-x}\text{Co}_x)\text{SnS}_4$  Nanocrystals and Formation of Polycrystalline Thin Films from Their Aqueous Dispersions," *J. Mater. Chem. A* **6**, 999-1008 (2018). <https://dx.doi.org/10.1039/C7TA06295H>
206. D. Ray, C. Clark, H. Q. Pham, J. Borycz, R. J. Holmes, E. S. Aydil, and L. Gagliardi, "Computational Study of Structural and Electronic Properties of Lead-Free  $\text{CsMI}_3$  Perovskites (M = Ge, Sn, Pb, Mg, Ca, Sr, and Ba)," *J. Phys. Chem. C* **122**, 7838-7848 (2018).
207. B. Benton, B. Greenberg, E. S. Aydil, U. Kortshagen and S. Campbell, "Variable Range Hopping Conduction in ZnO Nanocrystal Thin Films," *Nanotechnology* **29**, 415202 (2018). <https://doi.org/10.1088/1361-6528/aad6ce>
208. J. D. Dwyer, E. Juarez Diaz, T. E. Webber, A. Katzenberg, M. A. Modestino and E. S. Aydil, "Quantum Confinement in Few Layer SnS Nanosheets," *Nanotechnology* **30**, 245705 (2019). <https://dx.doi.org/10.1088/1361-6528/ab0e3e>
209. B. Voigt, W. Moore, M. Manno, J. Walter, J. D. Jeremiason, E. S. Aydil and C. Leighton, "Transport Evidence for Sulfur Vacancies as the Origin of Unintentional *n*-Type Doping in Pyrite  $\text{FeS}_2$ ," *ACS Applied Materials & Interfaces* **11**, 15552–15563 (2019). <https://dx.doi.org/10.1021/acsami.9b01335>

210. H. Q. Pham, R. J. Holmes, E. S. Aydil and L. Gagliardi, "Lead-free double perovskites  $\text{Cs}_2\text{InCuCl}_6$  and  $(\text{CH}_3\text{NH}_3)_2\text{InCuCl}_6$ : electronic, optical, and electrical properties," *Nanoscale* **11**, 11173-11182 (2019). <https://dx.doi.org/10.1039/C9NR01645G>
211. B. L. Greenberg, Z. L. Robinson, Y. Ayinob, J. T. Held, T. A. Peterson, K. A. Mkhoyan, V. S. Pribiagb, E. S. Aydil and U. R. Kortshagen, "Metal-Insulator Transition in a Semiconductor Nanocrystal Network," *Science Advances* **5**, eaaw1462 (2019). <https://dx.doi.org/10.1126/sciadv.aaw1462>
212. C. Clark, B. Voigt, E. S. Aydil and R. Holmes, "Carrier-gas Assisted Vapor Deposition for Highly Tunable Morphology of Halide Perovskite Thin Films," *Sustainable Energy & Fuels* **3**, 2447-2455 (2019). <https://dx.doi.org/10.1039/c9se00200f>
213. C. A. Beaudette, J. T. Held, B. L. Greenberg, P. H. Nguyen, N. M. Concannon, R. J. Holmes, K. A. Mkhoyan, Eray S. Aydil, and U. R. Kortshagen, "Plasmonic nanocomposites of zinc oxide and titanium nitride," *J. Vac. Sci. Technol. A* **38**, 042404 (2020). <https://avs.scitation.org/doi/10.1116/1.5142858>
214. D. Ray, B. Voigt, M. Manno, C. Leighton, E. S. Aydil, and L. Gagliardi, "Sulfur Vacancy Clustering and Its Impact on Electronic Properties in Pyrite  $\text{FeS}_2$ ," *Chem. Mater.* **32**, 4820-4831 (2020). <https://doi.org/10.1021/acs.chemmater.0c01669>
215. B. Voigt, W. Moore, M. Maiti, J. Walter, B. Das, M. Manno, C. Leighton, and E. S. Aydil, "Observation of an Internal p-n Junction in Pyrite  $\text{FeS}_2$  Single Crystals: Potential Origin of the Low Open Circuit Voltage in Pyrite Solar Cells," *ACS Materials Letters* **2**, 861-868 (2020). <https://dx.doi.org/10.1021/acsmaterialslett.0c00207>
216. J. T. Batley, M. Nguyen, I. Kamboj, C. Korostynski, E. S. Aydil and C. Leighton, "Quantitative Understanding of Superparamagnetic Blocking in Thoroughly Characterized Ni Nanoparticle Assemblies," *Chem. Mater.* (2020). <https://doi.org/10.1021/acs.chemmater.0c01758>
217. M. N. Tran, I. J. Cleveland and E. S. Aydil, "Resolving the discrepancies in the reported optical absorption of low-dimensional non-toxic perovskites,  $\text{Cs}_3\text{Bi}_2\text{Br}_9$  and  $\text{Cs}_3\text{BiBr}_6$ ," *J. Mater. Chem. C* **8**, 10456-10463 (2020). <https://doi.org/10.1039/D0TC02783A>
218. X. Wu, B. L. Greenberg, Y. Zhang, J. T. Held, D. Huang, J. G. Barriocanal, K. A. Mkhoyan, E. S. Aydil, U. Kortshagen and X. Wang, "Thermal Transport in ZnO Nanocrystal Networks Synthesized by Nonthermal Plasma," *Phys. Rev. Materials* **4**, 086001 (2020). <https://journals.aps.org/prmaterials/abstract/10.1103/PhysRevMaterials.4.086001>
219. C. P. Clark, J. E. Mann, J. S. Bangsund, W.-J. Hsu, E. S. Aydil, R. J. Holmes, "Formation of Stable Metal Halide Perovskite/Perovskite Heterojunctions," *ACS Energy Lett.* **5**, 3443-3451 (2020). <https://doi.org/10.1021/acsenerylett.0c01609>
220. M. N. Tran, I. J. Cleveland, and E. S. Aydil, "Physical Vapor Deposition of the Halide Perovskite  $\text{CsBi}_2\text{Br}_7$ ," *J. Vac. Sci. Technol. A* **39**, 013409 (2021). <https://doi.org/10.1116/6.0000604>
221. B. Voigt, B. Das, D. M. Carr, D. Ray, M. Maiti, W. Moore, M. Manno, J. Walter, E. S. Aydil and C. Leighton, "Mitigation of the internal p-n junction in  $\text{CoS}_2$ -contacted  $\text{FeS}_2$  single crystals: Accessing bulk semiconducting transport," *Phys. Rev. Mater.* **5**, 025405 (2021). <https://doi.org/10.1103/PhysRevMaterials.5.025405>
222. I. J. Cleveland, M. N. Tran, A. Dey, and E. S. Aydil, "Vapor Deposition of  $\text{CsPbBr}_3$  Thin Films by Evaporation of  $\text{CsBr}$  and  $\text{PbBr}_2$ ," *J. Vac. Sci. Technol. A* **39**, 043415 (2021). <https://doi.org/10.1116/6.0000875>
223. M. N. Tran, I. J. Cleveland, G. Pusterino and E. S. Aydil, "Efficient near-infrared Emission from lead-free ytterbium-doped cesium bismuth lead halide perovskites," *J. Mater. Chem. A* **9**, 13026 - 13035 (2021). <https://doi.org/10.1039/D1TA02147H>
224. M. R. Scimeca, M. Mattu, I. J. Paredes, M. N. Tran, S. J. Paul, E. S. Aydil and A. Sahu, "The Origin of Intraband Optical Transitions in  $\text{Ag}_2\text{Se}$  Colloidal Quantum Dots," *J. Phys. Chem. C* **125**, 17556-17564 (2021). <https://doi.org/10.1021/acs.jpcc.1c05371>
225. A. Angulo, L. Yang, E. S. Aydil and M. A. Modestino, "Machine learning enhanced spectroscopic analysis: towards autonomous chemical mixture characterization for rapid process optimization," *Digital Discovery* <https://doi.org/10.1039/D1DD00027F>

226. T. Ono, S. Ganguly, Q. Tu, U. R. Kortshagen and Eray S. Aydil, "Plasma diagnostics and modeling of lithium-containing plasmas," *J. Phys. D: Appl. Phys.* **55**, 254001 (2022). <https://doi.org/10.1088/1361-6463/ac5c1d>
227. M. N. Tran, I. J. Cleveland, J. R. Geniesse and E. S. Aydil, "High Photoluminescence Quantum Yield Near-Infrared Emission from a Lead-Free Ytterbium-Doped Double Perovskite," *Materials Horizons* 2191-2197 (2022). <https://dx.doi.org/10.1039/D2MH00483F>
228. B. Das, J. Batley, K. Krycka, J. Borchers, P. Quarterman, C. Korostynski, M. Nguyen, I. Kamboj, E. S. Aydil and C. Leighton, "Chemically-induced Magnetic Dead Shells in Superparamagnetic Ni Nanoparticles Deduced from Polarized Small-Angle Neutron Scattering," *ACS Applied Materials & Interfaces* **14**, 33491-33504 (2022). <https://doi.org/10.1021/acsami.2c05558>
229. M. N. Tran, I. J. Cleveland and E. S. Aydil, "Reactive Physical Vapor Deposition of Yb-Doped Lead-Free Double Perovskite Cs<sub>2</sub>AgBiBr<sub>6</sub> with 95% Photoluminescence Quantum Yield," *ACS Appl. Electron. Mater.* **4**, 4588–4594 (2022). <https://doi.org/10.1021/acsaelm.2c00788>
230. M.-W. Kim, Y.G. Yuan, S. Jeong, J. Chong, H. Mølneås, A. Alaei, I. J. Cleveland, N. Liu, Y. Ma, S. Strauf, E. S. Aydil, A. Sahu, D. M. Kalyon, and S. S. Lee, "Electrospun Tri-Cation Perovskite Nanofibers for Infrared Photodetection," *Adv. Funct. Mater.* **32**, 2207326 (2022). <https://doi.org/10.1002/adfm.202207326>
231. D. Mallapragada, Y. Dvorkin, M. Modestino, D. Esposito, W. Smith, B.-M Hodge, M. Harold, V. Donnelly, A. Nuz, C. Bloomquist, K. Baker, L. Grabow, Y. Yan, N. N. Rajput, R. Hartman, E. Biddinger, E. Aydil and A. Taylor, "Decarbonization of the Chemical Industry through Electrification: Barriers and Opportunities," *Joule* **7**, 23-41 (2023). <https://doi.org/10.1016/j.joule.2022.12.008>
232. Y. Liu, M. N. Tran, I. J. Cleveland and E. S. Aydil, "Physical vapor deposition of Yb-doped Cs<sub>2</sub>AgSbBr<sub>6</sub> films," *J. Vac. Sci. Technol. B* **41**, 022206 (2023). <https://doi.org/10.1116/6.0002475>
233. Y. Liu, I. J. Cleveland, M. N. Tran, and E. S. Aydil, "Stability of the Halide Double Perovskite Cs<sub>2</sub>AgInBr<sub>6</sub>," *J. Phys. Chem. Lett.* **14**, 3000-3006 (2023). <https://doi.org/10.1021/acs.jpcclett.3c00303>
234. S. Pramanik, N. Trejo, E. McIntire, N. V. Hudson-Smith, B. Tuga, J. He, E. S. Aydil, C. L. Haynes, "Transformations and Environmental Impacts of Copper Zinc Tin Sulfide Nanoparticles and Thin Films," *ACS Applied Materials & Interfaces* **15**, 24978-24988 (2023). <https://doi.org/10.1021/acsami.3c00374>
235. I. J. Cleveland, M. N. Tran, S. Kabra, K. Sandrakumar, H. Kannan, A.Sahu, and E. S. Aydil, "Physical vapor deposition of Yb-doped CsPbCl<sub>3</sub> thin films for quantum cutting," *Phys. Rev. Mater.* **7**, 065404 (2023). <https://doi.org/10.1103/PhysRevMaterials.7.065404>
236. B. Voigt, L. Stolik Valor, W/ Moore, J. D. Jeremiason, J. Kakalios, E. S. Aydil and C. Leighton, "Controlled p-Type Doping of Pyrite FeS<sub>2</sub>," *ACS Applied Materials & Interfaces* **15**, 24978-24988 (2023). <https://doi.org/10.1021/acsami.3c04662>

#### SELECTED INVITED PRESENTATIONS AND SEMINARS

- 2023 **(Invited)** POSTECH-NYU-KAIST-UNSW Symposium on Chemical and Biomolecular Engineering, Pohang, Republic of Soth Korea, "Surpassing Solar Cell Efficiency Limits via Quantum Cutting," Eray S. Aydil, July 11, (2023).
- 2023 **(Invited)** University of Alabama Chemical and Biological Engineering Department Seminar, Tuscaloosa, Alabama, "Halide Perovskite Materials for Efficient Spectral Downconversion to Decrease the Cost of Electric Power from Silicon Solar Modules," Eray S. Aydil, April 20, (2023).
- 2023 **(Invited)** Brigham Young University Chemical Engineering Department Seminar, Provo, Utah, "Halide Perovskite Materials for Efficient Spectral Downconversion to Decrease the Cost of Electric Power from Silicon Solar Modules," Eray S. Aydil, Mach 16, 2023
- 2022 **(Invited)** Materials Research Society Meeting, Boston, Massachusetts, "High Photoluminescence Quantum Yield Downconversion in Ytterbium-Doped Metal Halide Perovskites," Eray S. Aydil, November 29, (2022).

- 2022 **(Invited)** University of California Merced, Materials and Biomaterials Science and Engineering Department Seminar, “Changing the Sun: Quantum Cutting Materials to Increase the Efficiency and Lifetimes of Silicon Solar Cells,” Eray S. Aydil, October 24, (2022).
- 2022 **(Invited)** Online Low Temperature Plasma (OLTP) seminar organized jointly with International Online Plasma Seminar (IOPS), “The Role of Plasmas in the Electrification and Decarbonization of Chemical Manufacturing,” Eray Aydil, Andrea Angulo, Enrico Chinello, Joseph Geniesse, and Miguel Modestino, December 13, (2022).
- 2022 **(Invited)** Department of Energy (DoE) Fusion Energy Sciences (FES) Workshop on Plasma Science for Microelectronics Nanofabrication, Gaithersburg, Maryland, “Plasmas for New Semiconductor Materials,” Eray S. Aydil and Uwe Kortshagen, August 8 (2022).
- 2022 **(Invited)** AVS e-Talk, “Changing the Sun: Quantum Cutting Materials to Increase the Efficiencies and Lifetimes of Silicon Solar Cells,” Eray S. Aydil, June 8, (2022).
- 2022 **(Invited)** 4th International Symposium of the Vacuum Society of Philippines, Virtual “How to write and prepare scientific articles for publication in peer-reviewed journals,” Eray S. Aydil, April 20 (2022).
- 2022 **(Invited)** National Science Foundation ECosystem for Leading Innovation in Plasma Science and Engineering (ECLIPSE) Meeting, Alexandria, Virginia “The Role of Plasmas in the Decarbonization of Chemical Manufacturing,” Andrea Angulo, Enrico Chinello, Joseph Geniesse, Eray S. Aydil (speaker), and Miguel Modestino, March 9, (2022).
- 2022 **(Invited)** Indian Institute of Chemical Engineers (IChE) Student Chapter Seminar Sant Longowal Institute of Engineering and Technology (SLIET), Punjab India “Increasing the Silicon Solar Cell Efficiencies Above Fundamental Limits,” Eray S. Aydil, December 3 (2021).
- 2021 **(Invited)** 2<sup>nd</sup> International Conference on Materials Science and Nanotechnology (Future Materials 2021), Spain (Virtual) “Quantum cutting with rare-earth doped halide perovskites,” E. S. Aydil, July 5-7 (2021).
- 2021 **(Invited)** University of Washington Chemical Engineering Department Seminar, Seattle, Washington (Virtual), “Reviving Fool’s Gold as a Photovoltaic Material,” E. S. Aydil, April 26, 2021.
- 2021 **(Invited Keynote)** International e-Workshop on Science and Technology of Emerging Materials, Chettinad College of Engineering and Technology, Karur, Tamil Nadu, India, (Virtual) “Increasing the Silicon Solar Cell Efficiencies Above Fundamental Limits,” Eray S. Aydil, April 21, 2021.
- 2020 **(Invited)** New York University Chemistry Department Seminar, “Reviving Fool’s Gold as a Photovoltaic Material,” Eray S. Aydil, February 28, 2020.
- 2019 **(Invited)** Stevens Institute of Technology, Chemical Engineering and Materials Science Department Seminar, “Reviving Fool’s Gold as a Photovoltaic Material,” Eray S. Aydil, November 2019.
- 2018 **(Invited)** AIChE Annual Meeting, Pittsburgh, Pennsylvania, “Insulator-Metal Transition in Plasma-Synthesized ZnO Nanocrystal Networks,” E. S. Aydil (speaker), B. Greenberg, Z. Robinson, J. Held, A. Mkhoyan and U. Kortshagen, November 1, 2018.
- 2018 **(Invited, Plenary Talk)** 17th International Conference on Organized Molecular Films (ICOMF), Brooklyn, New York, “Insulator-Metal Transition in Nanocrystal Networks Formed via Supersonic Impact Deposition of Nanocrystals Synthesized in Nonthermal Plasmas,” E. S. Aydil, July 25, 2018.
- 2018 **(Invited)** Tufts University, Chemical and Biological Engineering Department, Boston, Massachusetts, “Insulator-Metal Transition in Plasma-Synthesized Nanocrystal Networks,” E. S. Aydil, March 26, 2018.
- 2018 **(Invited)** Louisiana State University, Department of Chemical and Petroleum Engineering, Baton Rouge, Louisiana, “Making Thin film Solar Cells from Colloidal Nanocrystal Dispersions,” E. S. Aydil, December 1, 2017.
- 2017 **(Invited)** University of Kansas, Department of Chemical and Petroleum Engineering, Lawrence, Kansas, “Making Thin film Solar Cells from Colloidal Nanocrystal Dispersions,” E. S. Aydil, October 19, 2017.



- 2017 **(Invited)** 3M Corporation Seminar, St. Paul, Minnesota, “Sustainable Sulfides for Solar Cells,” E. S. Aydil, June 20, 2017.
- 2016 **(Invited)** University of Virginia, Department of Chemical and Biomolecular Engineering Seminar, “Making CZTS Thin Film Solar Cells from Colloidal Nanocrystal Dispersions,” E. S. Aydil, October 12, 2016.
- 2016 **(Invited)** St. Catherine University, Department of Chemistry Seminar, St. Paul, Minnesota, “The Tortoise and the Hare: A Tale of Solar Cells,” E. S. Aydil, October 7, 2016.
- 2016 **(Invited)** Iowa State University, Department of Chemical Engineering Seminar, “Making CZTS Thin Film Solar Cells from Colloidal Nanocrystal Dispersions,” E. S. Aydil, March 3, 2016.
- 2016 **(Invited)** New York University Tandon School of Engineering, Department of Chemical and Biomolecular Engineering Seminar, “Making CZTS Thin Film Solar Cells from Colloidal Nanocrystal Dispersions,” E. S. Aydil, February 12, 2016.
- 2015 **(Invited)** SUNY Buffalo, Department of Chemical and Biological Engineering Seminar, “Making CZTS Thin Film Solar Cells from Colloidal Nanocrystal Dispersions,” E. S. Aydil, November 3, 2015.
- 2015 **(Invited)** Center for Integrated Nanotechnologies Users Meeting, Santa Fe, New Mexico, “Thin film Solar Cells Based on the Earth Abundant Solar Absorber  $\text{Cu}_2\text{ZnSn}(\text{S}_x\text{Se}_{1-x})_4$  From Colloidal Nanocrystal Dispersions,” E. S. Aydil, September 21, 2015.
- 2015 **(Plenary, Invited)** Nanoscale Informal Science Education Network Meeting, Science Museum of Minnesota, St. Paul Minnesota, “Future of Nanoscience Engineering and Technology: Solar Cells,” E. S. Aydil, June 3, 2015.
- 2015 **(Invited)** University of Massachusetts, Department of Chemical Engineering Department Seminar, Amherst, Massachusetts, “Making Thin film Solar Cells based on the Earth Abundant Solar Absorber  $\text{Cu}_2\text{ZnSn}(\text{S}_x\text{Se}_{1-x})_4$  from Colloidal Nanocrystal Dispersions,” E. S. Aydil, April 30, 2015.
- 2015 **(Invited)** 144<sup>th</sup> Annual TMS Meeting, Orlando, Florida, “Making Polycrystalline Thin Films of the Earth Abundant Solar Absorber  $\text{Cu}_2\text{ZnSn}(\text{S}_x\text{Se}_{1-x})_4$  from Colloidal Nanocrystal Dispersions,” B. Chernomordik, N. Trejo, P. Ketkar, A. Hunter, A. Beland, D. Deng and E. S. Aydil (speaker), March 16, 2015.
- 2015 **(Invited)** University of California Santa Barbara, Chemical Engineering Department Seminar, Santa Barbara California, “CIGS and CZTS Thin Film Solar Cells,” E. S. Aydil, February 27, 2015.
- 2015 **(Invited)** Gustavus Adolphus College, Department of Chemistry Seminar, St. Peter, Minnesota “Serendipitous Advances in Solar Cells: How Research Really Works” E. S. Aydil, February 13, 2015.
- 2015 **(Invited)** Wayne State University, Nano@Wayne Seminar, Detroit, Michigan, “Making Thin Film Solar Cells from Colloidal Nanocrystal Dispersions,” E. S. Aydil, January 20, 2015.
- 2015 **(Invited)** Energy Materials Nanotechnology Photovoltaics Meeting, Orlando, Florida, “Factors Affecting the Microstructure Phase Composition and Electronic Properties of  $\text{Cu}_2\text{ZnSnS}_4$  Thin Films Synthesized via Sulfidation of Cu-Zn-Sn Alloys,” M. Johnson, M. Manno, X. Zhang, S. V. Baryshev, E. Thimsen, C. Wrasman, I. V. Veryovkin, C. Leighton and E. S. Aydil (speaker), January 13, 2015.
- 2014 **(Invited)** University of Houston, Chemical Engineering Department Seminar, Houston, Texas, “ Making Thin Film Solar Cells from Colloidal Nanocrystal Dispersions,” E. S. Aydil, December 19, 2014.
- 2014 **(Invited)** PacSurf Conference, Hawaii, “Thin Film Solar Cells from Colloidal Nanocrystal Coatings,” E. S. Aydil, December 8, 2014.
- 2014 **(Invited)** Energy Materials Nanotechnology Meeting Workshop on Nanomaterials for Photochemical Solar Cells, Orlando, Florida, “Synthesis of Nanostructured Titanium Dioxide for Solar Energy Conversion,” November 23, 2014.
- 2014 **(Invited)** AIChE Annual Meeting, Atlanta, Georgia, “Copper Zinc Tin Sulfide (Selenide) Thin Films For Solar Cells: Microstructure Development in  $\text{Cu}_2\text{ZnSn}(\text{S}_x\text{Se}_{1-x})_4$  Thin Films During Annealing of Nanocrystal Coatings,” B. Chernomordik, P. Ketkar, A. Hunter, A. E. Beland, and E. S. Aydil (speaker), November 17, 2014.

- 2014 **(Invited)** International Society of Coating Science and Technology Symposium, Carlsbad, California, “Thin Film Solar Cells from Colloidal Nanocrystal Coatings,” E. S. Aydil, September 7, 2014.
- 2014 **(Invited)** University of California Riverside, Materials Science and Engineering Department Seminar, “Copper Indium Gallium Selenide and Copper Zinc Tin Sulfide Thin Film Solar Cells,” E. S. Aydil, June 4, 2014.
- 2014 **(Invited)** US-Uzbekistan Conference in Mathematics, Physical Sciences and Engineering, Fullerton, California, “Factors Affecting the Microstructure of Copper Zinc Tin Sulfide Films,” E. S. Aydil, May 21, 2014.
- 2014 **(Invited)** University of Washington at St. Louis, Department of Mechanical Engineering and Materials Science Seminar, “Copper Indium Gallium Selenide and Copper Zinc Tin Sulfide Thin Films for Solar Cells,” E. S. Aydil, March 2014.
- 2014 **(Invited)** Naval Research Laboratory Electronic Science and Technology Division Colloquium, “Copper Zinc Tin Sulfide and Iron Disulfide thin films for solar cells,” E. S. Aydil, February 2014.
- 2013 **(Invited)** Materials Research Society Fall Meeting, Boston, Massachusetts, “Factors Affecting the Microstructure of Copper Zinc Tin Sulfide Films,” B. D. Chernomordik, M. Johnson, B. S. Tosun, M. Manno, X. Zhang, E. Thimsen, A. E. Beland, D. Deng, C. Wrasman, M. Quan, C. Leighton and E. S. Aydil (speaker), December 2013.
- 2013 **(Invited)** 246<sup>th</sup> American Chemical Society National Meeting, Indianapolis, Indiana, “Thin Films from Colloidal Dispersions of Copper Zinc Tin Sulfide Nanocrystals,” E. S. Aydil (speaker), B. D. Chernomordik, B. S. Tosun, D. Deng and A. Beland, September 2013.
- 2013 **(Invited, Keynote Speaker)** iPlasmaNano-IV, the 4<sup>th</sup> International Symposium on Plasma Nanoscience, Asilomar, California, “Plasma Synthesis of Photovoltaic Materials,” E. S. Aydil (speaker), August 2013.
- 2013 **(Invited)** The Electrochemical Society, Electrochemistry Symposium, Minneapolis, Minnesota, “Copper Zinc Tin Sulfide Thin Films For Solar Cells,” E. S. Aydil (speaker), April 2013.
- 2013 **(Invited)** Materials Research Society Spring Meeting, San Francisco, California, “Plasma Synthesis of Photovoltaic Materials,” A. Baruth, X. Zhang, M. Manno, B. S. Tosun, R. Feist, M. Johnson, C. Leighton, U. Kortshagen, S. Campbell, A. Mkhoyan, and E. S. Aydil, April 2013.
- 2012 **(Invited)** AIChE Annual Meeting, Pittsburgh, Pennsylvania, “New Thin Film Solar Cell Materials from Earth Abundant Elements,” M. Johnson, M. Manno, B. Chernomordik, X. Zhang, S. A. Campbell, C. Leighton and E. S. Aydil (speaker), October 2012.
- 2012 **(Invited)** Purdue University, Department of Chemical Engineering, “CIGS and CZTS Solar Cells,” E. S. Aydil, October 2012.
- 2012 **(Invited)** University of Washington, Department of Chemical Engineering, “CIGS and CZTS Solar Cells,” E. S. Aydil, October 2012.
- 2012 **(Invited)** Annual Society for Industrial and Applied Mathematics (SIAM) Meeting, Minneapolis, Minnesota, “Present Status of and Challenges in Solar-to-Electric Energy Conversion Using Solar Cells,” Eray S. Aydil, July 2012.
- 2011 **(Invited)** Drexel University, Department of Chemical and Biomolecular Engineering Seminar, Philadelphia, Pennsylvania, “Quantum Dot Solar Cells,” Eray S. Aydil, November 2011.
- 2011 **(Invited)** AIChE Annual Meeting, Minneapolis, Minnesota, “Towards Quantum Dot Solar Cells from Abundant Nontoxic Materials,” A. Khare, A. W. Wills, B. D. Chernomordik, D. J. Norris and E. S. Aydil (speaker), October 2011.
- 2011 **(Invited, Plasma Prize lecture)** 58<sup>th</sup> International AVS Symposium, Nashville, Tennessee, “The Role of Atomic Hydrogen on Plasma Synthesis of Carbon Nanotubes,” E. S. Aydil, October 2011.
- 2011 **(Invited, Keynote Speaker)** University of Houston, Department of Chemical and Biomolecular Engineering 26<sup>th</sup> OChEGS Symposium, Houston, Texas, “Thin Film Solar Cells: State of the Art and the Future,” Eray S. Aydil, October 2011.

- 2011 **(Invited)** Cornell University, Department of Chemical and Biomolecular Engineering Seminar, Ithaca, New York, “Quantum Dot Solar Cells,” Eray S. Aydil, September 2011.
- 2011 **(Invited)** The Center for Advanced Solar Photophysics (CASP) 2011 Summer Workshop, University of California Irvine, Irvine, California “Quantum Dot Solar Cells,” Eray S. Aydil, July 2011.
- 2011 **(Invited)** Georgia Institute of Technology, Atlanta, Georgia, Department of Chemical Engineering Seminar “Quantum Dot Solar Cells,” Eray S. Aydil, February 2011.
- 2010 **(Invited)** University of Wisconsin, Madison, Wisconsin, Department of Materials Science and Engineering, “Quantum-Dot Solar Cells,” Eray S. Aydil, September 2010.
- 2010 **(Invited)** Rensselaer Polytechnic Institute, Troy, New York, Department of Chemical and Biological Engineering Seminar, “Quantum-Dot Solar Cells,” Eray S. Aydil, September 2010.
- 2010 **(Invited)** National Science Foundation Workshop on Photovoltaics, Golden, Colorado, “Materials Availability for TW-Scale Photovoltaics,” Eray S. Aydil, September 2010
- 2010 **(Invited)** Materials Research Society Fall Meeting, San Francisco, California, “Nanowire Quantum Dot Solar Cells,” Kurtis S. Leschkies, Moon-Sung Kang, Alan G. Jacobs, Timothy J. Beatty, David J. Norris and Eray S. Aydil, April 2010.
- 2009 **(Invited)** Materials Research Society Fall Meeting, Boston, Massachusetts, “Solar Cells Based on Junctions Between colloidal PbSe Nanocrystals and ZnO,” E. S. Aydil (speaker), K. S. Leschkies, T. J. Beatty, A. Jacobs, M. S. Kang and D. J. Norris, December 2009.
- 2009 **(Invited)** Minneapolis Rotary Club, “Solar Power: State-of-the-art and the Future,” Eray S. Aydil, October 2009.
- 2008 **(Invited)** Colorado School of Mines, Department of Chemical Engineering Seminar “Diamonds from Carbon Nanotubes at Room Temperature?” E. S. Aydil, August 2008.
- 2008 **(Invited)** Gordon Research Conference on Plasma Processing Science “Diamonds from Carbon Nanotubes at Room Temperature?” E. S. Aydil, July 2008.
- 2008 **(Invited)** American Chemical Society, New Orleans, Louisiana, “Quantum-dot Sensitized Solar Cells,” E. S. Aydil (speaker), K. S. Leschkies, R. Divakar, J. Basu, E. Enache-Pommer, J. E. Boercker, C. B. Carter, U. R. Kortshagen, and D. J. Norris, April 2008.
- 2008 **(Invited)** University of California, Berkeley, Chemical Engineering Department Seminar “Hydrogen induced transformations of carbon nanotubes to other carbon allotropes ,” E. S. Aydil (speaker) , M. J. Behr, A. Muniz, T. Singh, and D. Maroudas April 2008.
- 2008 **(Invited)** Case Western Reserve University, Chemical Engineering Department Seminar, Cleveland, Ohio, “Nanowire Solar Cells.” March 2008.
- 2008 **(Invited)** University of California Los Angeles, Department of Chemical and Biomolecular Engineering Seminar, Los Angeles, California, “Nanowire Solar Cells,” January 2008.
- 2007 **(Invited)** National Nanomanufacturing Network, Workshop on Advancing Solar Energy Conversion Devices Through Nanotechnology and Nanomanufacturing, University of Massachusetts, Amherst, Amherst, Massachusetts, “Nanowire Based Dye- and Quantum-dot Sensitized Solar Cells,” E. S. Aydil (speaker), K. S. Leschkies, R. Divakar, J. Basu, E. Enache-Pommer, J. E. Boercker, C. B. Carter, U. R. Kortshagen, and D. J. Norris, May 2007.
- 2007 **(Invited)** Fourth U.S.-Korea Forum on Nanotechnology, Honolulu, Hawaii, “ZnO Nanowire Based Solar Cells,” E. S. Aydil (speaker), K. S. Leschkies, R. Divakar, J. Basu, E. Enache-Pommer, J. E. Boercker, C. B. Carter, U. R. Kortshagen, and D. J. Norris, April 2007.
- 2007 **(Invited)** Macalester College Physics Colloquium, Minneapolis, Minnesota, “ZnO Nanowire Based Solar Cells,” E. S. Aydil, February 2007.
- 2006 **(Invited)** AIChE Annual Meeting Area 8 Materials Plenary Session, San Francisco, California, “Nanostructured Materials for Solar-to-Electric Energy Conversion,” E. S. Aydil, November 2006.

- 2006 **(Invited)** Georgia Institute of Technology, Materials Science and Engineering Department Seminar Atlanta, Georgia “ZnO Nanowire based Solar Cells,” E. S. Aydil, October 2006.
- 2003 **(Invited)** University of California Riverside, Chemical Engineering Department Seminar, Riverside, California, “Plasma Deposition of Thin Silicon Films,” E. S. Aydil, May 2003.
- 2003 **(Invited)** Princeton University, Chemical Engineering Department Seminar, Princeton, New Jersey, “Challenges in Plasma Etching of High Aspect Ratio Features in Silicon,” E. S. Aydil, January 2003.
- 2002 **(Invited)** University of Massachusetts, Chemical Engineering Department Seminar, Amherst, Massachusetts, “Plasma Etching of High Aspect Ratio Features into Silicon,” E. S. Aydil, December 2002.
- 2002 **(Invited)** Colorado School of Mines, Chemical Engineering Department Seminar, Golden, Colorado, “Plasma Deposition of Thin Silicon Films,” E. S. Aydil, October 2002.
- 2001 **(Invited)** Purdue University, Chemical Engineering Department Seminar, Lafayette, Indiana, “Plasma Deposition of Thin Silicon Films,” E. S. Aydil, September 2001.
- 2001 **(Invited)** University of Florida Chemical Engineering Department Seminar, Gainesville, Florida, “Plasma Deposition of Thin Silicon Films,” E. S. Aydil, April 2001.
- 2001 **(Invited)** University of New Mexico Chemical Engineering Department Seminar, Albuquerque, New Mexico, “Plasma Deposition of Thin Silicon Films,” E. S. Aydil, March 2001.
- 2000 **(Invited)** 197<sup>th</sup> Meeting of the Electrochemical Society, Toronto, Canada, “A Combined Experimental and Theoretical Investigation of the Surface Reactions in Plasma Deposition of Hydrogenated Amorphous Silicon Films,” E. Aydil (speaker), D. Maroudas, D. C. Marra, S. Ramalingam, S. Sriraman, W. M. M. Kessels, R. Van de Sanden, May 2000.
- 2000 **(Invited)** University of Southern California, Department of Chemical Engineering, “A Combined Experimental and Theoretical Investigation of the Surface Reactions in Plasma Deposition of Thin Silicon Films,” E. S. Aydil (Speaker), D. Maroudas, D. C. Marra, and S. Ramalingam, February 2000.
- 2000 **(Invited)** BANPIS 2000, Basic Aspects of Non-Equilibrium Plasmas Interacting with Surfaces, Nagasaki, Japan, “Effects of Wall Conditions on the Cl Concentration in High Density Cl<sub>2</sub> Plasmas,” E. S. Aydil, S. J. Ullal, L. B. Braly, A. R. Godfrey, E. Edelberg, and V. Vahedi, January 2000.
- 1999 **(Invited, Peter Mark Award Address)** 46<sup>th</sup> International Symposium of the American Vacuum Society, Seattle, Washington, “Plasma Deposition of Silicon,” E. S. Aydil, October 1999.
- 1999 **(Invited)** Materials Research Institute of National university of Mexico, Meeting on New Horizons in Materials Science, “Plasma Deposition of Low Dielectric Constant Materials: Fluorinated Silicon Dioxide and Parylene-F-like Thin Films,” E. S. Aydil, (speaker) S. M. Han A. Aydinli, B. F. Hanyaloglu, January 1999.
- 1999 **(Invited)** University of California Los Angeles Chemical Engineering Department “Ion Transport Across Plasma Sheaths,” E. S. Aydil, January 1999.
- 1998 **(Invited)** North Carolina State University, Chemical Engineering Department, “Plasma Deposition of Silicon Thin Films,” E. S. Aydil, October 1998.
- 1998 **(Invited)** University of California Berkeley, Chemical Engineering Department “Ion Transport Across Plasma Sheaths,” E. S. Aydil, September 1998.
- 1998 **(Invited)** 1998 International Microprocesses and Nanotechnology Conference, Kyoungju, South Korea, “Nature of the Silicon and Silicon Dioxide Surfaces During Plasma Etching with Fluorocarbon Containing Discharges,” E. S. Aydil (speaker), and D. C. Marra, July 1998.
- 1998 **(Invited)** University of Wisconsin, Applied Physics Department and NSF Engineering Center for Plasma Aided Manufacturing, ERC Seminar, Madison, Wisconsin, “Application of Total Internal Reflection Spectroscopy as a Diagnostic Tool For Studying Surfaces and Films During Plasma Etching and Deposition,” E. S. Aydil, April 1998.

- 1996 **(Invited)** California Institute of Technology, Department of Chemical Engineering, Department Seminar, "Plasma Enhanced Chemical Vapor Deposition of Silicon Dioxide and Luminescent Nanocrystalline Silicon Films," E. S. Aydil, December 1996.
- 1996 **(Invited)** University of Michigan, Department of Electrical Engineering and Computer Science, Department Seminar "In Situ Monitoring of Plasmas and Surfaces During Glow Discharge Processing," E. S. Aydil, September 1996.
- 1996 **(Invited)** University of California Los Angeles, Department of Chemical Engineering, Department Seminar, "Plasma Enhanced Chemical Vapor Deposition of Silicon Dioxide," E. S. Aydil, May 1996.
- 1996 **(Invited)** University of California Davis, Department of Chemical Engineering, Department Seminar, "Plasma Enhanced Chemical Vapor Deposition of Silicon Dioxide and Luminescent Nanocrystalline Silicon Films," E. S. Aydil, April 1996.
- 1995 **(Invited)** 7th International Symposium on Laser-Aided Plasma Diagnostics, December 5, Fukuoka, Japan "Progress in In Situ Monitoring of Surfaces During Plasma Processing," E. S. Aydil.
- 1995 **(Invited)** Korean Advanced Institute of Science and Technology (KAIST), Department of Physics, Taejon, Korea, "Plasma and Surface Diagnostics During Plasma Enhanced Chemical Vapor Deposition of SiO<sub>2</sub> from SiH<sub>4</sub>/O<sub>2</sub>/Ar Discharge," E. S. Aydil.
- 1995 **(Invited)** Seoul National University, Department of Inorganic Materials Engineering, Department of Chemical Engineering and Inter-university Semiconductor Research Center, Seoul, Korea "Plasma and Surface Diagnostics During Plasma Enhanced Chemical Vapor Deposition of SiO<sub>2</sub> from SiH<sub>4</sub>/O<sub>2</sub>/Ar Discharge," E. S. Aydil.
- 1995 **(Invited)** Frontiers in Low Temperature Plasma Diagnostics, January 23-27, Les Houches, Centre de Physique des Houches, France, "In Situ Optical Spectroscopy Diagnostics of Surfaces During Plasma Processing of Materials," E. S. Aydil.
- 1994 **(Invited)**, 2nd International Conference on Reactive Plasmas and 11th Symposium on Plasma Processing, Yokohama, Japan, January 1994, "Real Time Monitoring of Surfaces During Plasma Processing Using Attenuated Total Reflection Fourier Transform Infrared Spectroscopy" E. S. Aydil (speaker), R. A. Gottscho, A. D. Bailey III, Y. J. Chabal, J. A. Gregus and Z. H. Zhou.
- 1993 **(Invited)**, 11th International Symposium on Plasma Chemistry, Loughborough, England, "Real-Time Monitoring of Plasma Surface Chemistry," E. S. Aydil, August 1993.

#### **POSTDOCS AND STUDENTS SUPERVISED (with current affiliations)**

- Supervised 15 postdoctoral researchers and research scientists:  
 Shashank Deshmukh, 6/93-6/94 (Lam Research Corporation)  
 Bengi Hanyaloglu, 3/97-6/99 (Raytheon)  
 Linda Braly 6/99-1/00 (Lam Research Corporation)  
 Akihiro Takano 8/00-8/02 (F-WAVE Company Limited)  
 Sergi Gomez 4/02-4/04 (Intel, Ireland)  
 Radhika Mani 9/04 – 11/05 (Applied Materials)  
 Kyeong-Koo Chi 11/05 – 7/06 (Lam Research Corporation)  
 Jason Schmidt 7/05 – 7/06 (Danimer Scientific)  
 Lorenzo Mangolini 2/07-11/07 (Faculty, University of California Riverside)  
 Michael Manno 3/11-7/13 (Faculty, University of Minnesota)  
 Rebecca Anthony 9/11-6/13 (Faculty, Michigan State University)  
 Joel Abrahamson 7/12-10/13 (3M)  
 Elijah Thimsen 10/12-6/14 (Faculty, Washington University at St Louis)  
 Shreyashi Ganguly 8/13-8/16 (Faculty, Northwestern State University of Louisiana)  
 Seung Wook Shin 10/14- 10/17 (University of Toledo)

Enrico Chinello 8/20- 2/21 (Goldman Sachs)

- Advised and co-advised 35 PhD and MS graduate students:
  1. Sang Han 12/93-11/98 (Ph.D. 1998; Faculty, Univ. of New Mexico)
  2. Erik Edelberg 12/93-3/99 (Ph.D. 1999; Lam Research Corporation)
  3. Shyam Ramalingam, 12/94-2/00 (Ph.D. 2000; Micron)
  4. Denise C. Marra, 12/95-5/00 (Ph.D. 2000; Micron)
  5. Norma Alcantar, 12/95-12/00 (Ph.D. 2000; Faculty University of South Florida)
  6. Anna Godfrey, 12/98-12/01 (M.S. 2001; Clorox)
  7. Saurabh Ullal, 12/98-6/02 (Ph.D. 2002; ARC Energy)
  8. Tae Won Kim, 9/00-12/02 (Ph.D. 2002; Lam Research Corporation)
  9. Sumit Agarwal, 12/98-12/03 (Ph.D. 2003; Faculty, Colorado School of Mines)
  10. Saravanapriyan Sriraman, 12/98-12/03 (Ph.D. 2003; Lam Research Corporation)
  11. Ron Bessems, 02/03-12/04 (M.S. 2004; Promixis LLP)
  12. Jason Baxter 1/00-5/05 (Ph.D. 2005; Faculty, Drexel University)
  13. Jun Belen 01/02- 7/05 (Ph. D. 2005; Applied Materials)
  14. Mayur Valipa, 01/02-12/05 (Ph.D. 2006; McKinsey & Company)
  15. Janice Boercker, 1/05-8/09 (Ph.D. 2009; Naval Research Labs)
  16. Kurtis Leschkies, 1/05-9/09 (Ph.D. 2009; Applied Materials)
  17. Emil Enache-Pommer, 1/05-2/10 (Ph.D. 2009; Intel)
  18. Noritoshi Araki 1/08-5/10 (M.S. 2010)
  19. Michael Behr, 1/05-6/10 (Ph.D. 2010; Dow Chemical Corporation)
  20. William Tisdale, 1/06-6/10 (Ph.D. 2010; Faculty, Massachusetts Institute of Technology)
  21. Seong Ho Jeong, 1/06-6/10 (Ph.D. 2010; Samsung Korea)
  22. Bin Liu, 1/07-6/11 (Ph, D, 2011; Faculty, Nanyang Technological University, Singapore)
  23. Ankur Khare, 1/08-5/11 (Ph.D. 2012; Dupont Electronics)
  24. Selin Tosun, 1/09-6/13 (Ph.D. 2013; Amazon)
  25. Neema Rastgar, 1/10-9/13 (M.S. 2013; Lam Research Corporation)
  26. Boris Chernomordik, 1/10-9/14 (Ph.D. 2014; Leydig, Voit & Mayer, Ltd.)
  27. Melissa Johnson, 1/10-11/14 (Ph.D.; 2014; National Science Foundation)
  28. Sriharsa Jayanti, 1/10-8/15 (Ph.D. 2015; Lam Research Corporation)
  29. Xin Zhang, 1/11-8/15 (Ph.D. 2015; Lam Research Corporation)
  30. Bryce Williams 1/12-6/16 (Ph.D. 2016, 3M)
  31. Ben Greenberg 1/12 – 11/17 (Ph.D. 2017, Naval Research Lab)
  32. Nancy Trejo 1/13-8/18 (Ph.D. 2018, Swift Solar)
  33. Whitney Wenger 1/14-7/18 )Ph.D.,
  34. Bryan Voigt 12/15-11/20 (Ph.D. 2020, Lam Research Corporation)
  35. Catherine Clark (Casomar) 12/15-8/20 (Ph.D. 2020, American Association for the Advancement of Science)
  36. Minh Tran 1/19-present
  37. Iver J. Cleveland 1/19-present
  38. Yukun Liu 9/21-present
  39. Casey Bloomquist 9/21-present
  40. Seda Sarp 1/22-present

## CONSULTING

- Allen Vexler; Conmed Inc.; Crawath, Swaine & Moore; First Derivative Systems; General Electric; Hughes Santa Barbara Research Corporation; Innovalight; Lam Research Corporation; McAndrews, Held & Malloy; Meissner Filtration; Paul, Hastings, Janofsky & Walker; SiO2 Medical Products; Sage Electronics.

## UNIVERSITY AND DEPARTMENT SERVICE

- New York University, Tandon School of Engineering Male Allies Committee (2019-2022)

- New York University, Tandon School of Engineering Ranking Committee (2019-present).
- New York University, Chair, Department of Chemical and Biomolecular Engineering Faculty Search Committee (2018-2019).
- University of Minnesota College of Science and Engineering Teaching Fellow (2015).
- University of Minnesota Doctoral Dissertation Fellowship Committee (2011-2013).
- IPRIME Executive Committee (2009-2015).
- University of Minnesota Department of Chemical Engineering and Materials Science Faculty Search Committee (2010-2011).
- Scientific Advisory Panel for the University of Minnesota Climate Action Plan (2011).
- University of Minnesota 3M Heltzer Chair Search Committee Co-Chair (2009-2010).
- University of Minnesota, Department of Chemical Engineering and Materials Science Graduate Admissions and Recruiting Committee (2005-2009).
- University of Minnesota, Department of Mechanical Engineering Faculty Search Committee (2007-2008).
- University of Minnesota, Department of Chemical Engineering and Materials Science Faculty Search Committee (2007-2008).
- Member of the University of Minnesota National Science Foundation Materials Research Science and Engineering Center Executive Committee Member (2006-2008).
- University of Minnesota Institute of Technology Nanotechnology Center Committee (2005-2006).
- Various Promotion and Tenure Committees at the University of Minnesota, Department of Chemical Engineering and Materials Science (2005-2018).
- Vice Chairman of the Chemical Engineering Department at UCSB (2001-2005).
- Chairman of the Chemical Engineering Department Graduate Affairs Committee at UCSB (2002-2005).
- Member of the UCSB Chemical Engineering Department undergraduate Lab and Safety Committee (2002-2003).
- Member of the UCSB Chemical Engineering Department Web Committee (2002-2003).
- Member of the UCSB Chemical Engineering Department Faculty Search Committee (2001-2003).
- Member of the UCSB Academic Senate Committee on Research Policy and Council on Research and Instructional resources (2002-present).
- Member of the UCSB Chemical Engineering Department ABET Accreditation Committee (2001-2002).
- Chairman of the UCSB Chemical Engineering Department Graduate Student Admissions and Recruiting Committee (1999-2002). Member of the same committee (1993-2002, 2003-2005).
- Member of the UCSB Chemical Engineering Department Undergraduate Affairs and Curriculum Committee (1993-2002).
- Member of the UCSB. Central Fellowship Selection Committee, (1999).
- Member of the Campus Wide Academic Senate Committee on Undergraduate Courses at UCSB (1997- 1999).
- Member of the College of Engineering Executive Committee at UCSB (1997-1999).
- Member of the Chemical Engineering Department Merits and Promotions Committee at UCSB (1998-1999).

## **OTHER PROFESSIONAL ACTIVITIES AND INFORMATION**

- Routinely serve and served on review panels for the National Science Foundation (NSF), Department of Energy (DOE), National Research Council (NRC), California Semiconductor Manufacturing Alliance for Research and Training (SMART) Program and the UC Discovery Program.
- Reviewer and referee for numerous journals and agencies including the *ACS Nano*, *ACS Applied Materials and Interfaces*, *Advanced Materials*, *Advanced Functional Materials*, *Applied Physics Letters*, *ChemPhysChem*, *Chemical Communications*, *Chemical Engineering Science*, *Chemistry of Materials*, *Crystal Growth & Design*, *Electrochemical and Solid State Letters*, *Electrochimica Acta*, *Energy & Environmental Science*, *IEEE Transactions on Plasma Science*, *IEEE Transactions on Nanotechnology*, *Journal of Aerosol Science*, *Journal of the American Chemical Society*, *Journal of Crystal Growth*, *Journal of Alloys and Compounds*, *Journal of Applied Physics*, *Journal of Chemical Physics*, *Journal of Colloid and Interface Science*, *Journal of Physical Chemistry*, *Journal of Physics D: Applied Physics*, *Journal of the Electrochemical Society*; *Journal of Vacuum Science & Technology; A & B*, *Langmuir*, *Materials Chemistry and Physics*, *Materials Letters*, *Microporous and Meseoporous Materials*, *Nano Letters*, *Nanotechnology*, *Nature*, *Nature Materials*, *Plasma Sources Science and Technology*, *Physical Review Letters*, *Physical Review B*; *Review of Scientific Instruments*, *Science*, *Solar Energy Materials & Solar Cells*, *Tin Solid Films*, Petroleum Research Fund, the National Science Foundation, Department of Energy, UC

Energy Institute, UC Discovery Program, Israel National Science Foundation, and the Kentucky Science Foundation.

- Chaired and co-chaired sessions in national and international scientific meetings including
  - 2018, 2019 American Vacuum Society International Symposium
  - 2000 Gordon Research Conference on Plasma Science
  - 1993, 1994, 1996-1998, 2001-2003, 2005-2008, 2010 Annual Meetings of the AIChE,
  - 1994 International Society for Optical engineering (SPIE) meeting,
  - 1995 and 1996 Annual Meetings of the Electrochemical Society,
  - 1995 7th Laser-Assisted Plasma Diagnostics Meeting at Fukuoka, Japan,
  - 1995 meeting on Frontiers in Low Temperature Plasma Diagnostics, Centre de Physique des Houches, France.
- AIChE National Meeting Area 8e (Electronic and Photonic Materials) Program Chair (1999-2000).
- American Vacuum Society International Symposium Plasma Science and Technology Division Programming Committee member (1999-2003).
- American Vacuum Society International Symposium Plasma Science and Technology Division Executive Committee member (1999-2002).
- Appointed member of the California Semiconductor Manufacturing Alliance for Research and Training (SMART) Program Task Force (1998-1999).
- Appointed member of the California Semiconductor Manufacturing Alliance for Research and Training (SMART) Program Executive Committee (1999-2002).
- Appointed member of the UC Discovery Grants Program (Electronics Manufacturing and New Materials Program) Executive Committee (2002-2004).
- Southern California Chapter of the AVS, Leading Edge Student Symposium Chair, (2002).
- Member of the International Symposium on Semiconductor Manufacturing (ISSM) Programming Committee (2002-2004).
- Editorial Board Journal of Vacuum Science and Technology A (2004-2007).
- Editorial Board International Journal of Photoenergy (2009-2010).
- Member of the American Institute of Chemical Engineers (AIChE), the Electrochemical Society (ECS), the American Vacuum Society (AVS), American Chemical Society (ACS), Materials research Society (MRS).
- American Vacuum Society International Symposium Plasma Science Technology Executive Committee Member (2006-2008).
- American Vacuum Society International Symposium Plasma Science Technology Division Chair (2006-2007).
- AIChE National Meeting Area 8e (Electronic and Photonic Materials) Program Chair (2006-2007).
- SPIE Optics & Photonics Program Committee on "Nano Photonics & Cell Technologies for Photovoltaics" (2007-2009).
- Foundations of Nanoscience 2008 "Nanoplasmonics and Nanophotovoltaics" Track Chair (2008, 2009).
- American Vacuum Society International Symposium Programming Vice Chair in 2009 and Chair for 2010.
- American Vacuum Society International Symposium Topical Conference on Energy Frontiers Programming Chair (2011).
- American Vacuum Society International Symposium Topical Conference on Energy Frontiers Programming Co-Chair (2012-2014).
- 17<sup>th</sup> Topical Conference on Quantitative Surface Analysis Panel on Data reproducibility Challenges (2018).
- AVS Quantum Science Journal Editorial Board