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EDUCATION

Ph.D. in Materials Science and Engineering, February 1997, Seoul National University
M.S. in Materials Science and Engineering, February 1993, Seoul National University
B.S. in Materials Science and Engineering, February 1991, Seoul National University

EMPLOYMENT

2007-present: Associate Professor, Department of Mechanical Engineering, University of Colorado at Boulder
2009-2010: Invited Professor, Department of Materials Science and Engineering at Seoul National University (Leave of absence for one year, 8/2009-7/2010, from CU Boulder to participate in the World Class University Program at Seoul National University).
2007-2007: Senior Scientist II, National Renewable Energy Laboratory
2001-2007: Senior Scientist I, National Renewable Energy Laboratory
1999-2001: Staff Scientist, National Renewable Energy Laboratory
1997-1999: Postdoctoral Appointee, National Renewable Energy Laboratory

HONORS AND AWARDS

- 2010 CO-LABS Governor's Award for High-Impact Research (Research team for the development of electrochromic windows)
- Founding Research Fellow at the RASEI (Renewable and Sustainable Energy Institute)
- 2009 R&D 100 Award, PowerPlane UX Microbattery - a solid-state thin-film battery
- World Class University Professor, Hybrid Materials Major at Seoul National University 2009-2012.
- Invited speaker in the National Academy of Engineering 2008 Japan-American Frontiers of Engineering Symposium, Kobe, Japan Nov 17-19, 2008
- Outstanding Graduate Educator, Department of Mechanical Engineering, University of Colorado at Boulder. 9/2008
- Technology Transfer Award, National Renewable Energy Laboratory 12/2006
- Team of the Quarter, National Renewable Energy Laboratory 04/2006
- Outstanding Performance Awards, National Renewable Energy Laboratory 03/2006
- Employee of the Month, National Renewable Energy Laboratory 01/2000
- Employee of the Month, National Renewable Energy Laboratory 09/1998

PUBLICATIONS

1. "Nanostructured Silicon Electrodes For Solid-State 3-D Rechargeable Lithium Batteries", J. E. Trevey, J. Wang, C. M. De Luca, K. K. Maute, M. L. Dunn, S.-H. Lee, V. M. Bright, Sensors and Actuators A: Physical, (under review).
2. "Efficient photocatalytic degradation of orange dye on metal oxide p-n junction composites under visible light," Jum Suk Jang, Hyun Gyu Kim, and Se-Hee Lee, Electrochemical and Solid-State Letters, (under review).

3. "High Lithium Ion Conducting $\text{Li}_2\text{S}-\text{GeS}_2-\text{P}_2\text{S}_5$ Glass-Ceramic Solid Electrolyte with Sulfur Additive for All Solid-State Lithium Secondary Batteries," James E. Trevey, Yoon Seok Jung, and Se-Hee Lee, *Journal of Power Sources*, (under review).
4. "Ultrathin Coatings on Nano- LiCoO_2 for Li-ion Vehicular Applications," Isaac D. Scott, Yoon Seok Jung, Andrew S. Cavanagh, Yanfa Yan, Anne C. Dillon, Steven M. George, and Se-Hee Lee, *Nano Letters* (under review).
5. "Improved mechanical integrity of ALD-coated composite electrodes for Li-ion Batteries," Leah A. Riley, Andrew S. Cavanagh, Steven M. George, Se-Hee Lee, Anne C. Dillon, *Electrochemical and Solid-State Letters*, (accepted for publication).
6. "Electrochemical Effects of ALD Surface Modification on Combustion Synthesized $\text{LiNi}_{1/3}\text{Mn}_{1/3}\text{Co}_{1/3}\text{O}_2$ as a Layered-Cathode Material," Leah A. Riley, Sky Van Atta, Andrew S. Cavanagh, Yanfa Yan, Steven M. George, Ping Liu, Anne C. Dillon, and Se-Hee Lee, *Journal of Power Sources*, (accepted for publication).
7. "Photoelectrochemical Characteristics of Nano- WO_3 Powders Made with Hot-Wire Chemical Vapour Deposition," Christine M. White, Jum-Suk Jang, Joel Pankow, Anne C. Dillon, and Se-Hee Lee, *Electrochemical and Solid-State Letters*, 13, B120 (2010).
8. "Hydrogen sensor based on metallic photonic crystal slabs," D. Nau, A. Seidel, R. B. Orzekowsky, S.-H. Lee, S. Deb, and H. Giessen, *Optics Letters*, 35, 3150 (2010).
9. "All-Solid-State Lithium Batteries Using Nano-Silicon Active Material with Multi-Walled-Carbon-Nanotubes as a Conductive Additive," James E. Trevey, Conrad R. Stoldt, and Se-Hee Lee, *Electrochemical and Solid-State Letters*, 13, A154 (2010).
10. "Stress Generation in Silicon Particles During Lithium Insertion," Stephanie Golmon, Kurt Maute, Martin L. Dunn, and Se-Hee Lee, *Appl. Phys. Lett.*, 97, 033111 (2010).
11. "Conformal Surface Coatings to Enable High Volume Expansion Li-ion Anode Materials," Leah A. Riley, Andrew S. Cavanagh, Steven M. George, Yoon Seok Jung, Yanfa Yan, Se-Hee Lee, and Anne C. Dillon *ChemPhysChem* 11, 10 (2010).
12. "Preparation of $\text{Li}_2\text{S}-\text{GeSe}_2-\text{P}_2\text{S}_5$ Electrolytes by a Single Step Ball Milling for All-Solid-State Lithium Secondary Batteries," James Trevey, Yoon Seok Jung, and Se-Hee Lee, *Journal of Power Sources*, 195, 4984 (2010).
13. "Ultrathin Direct Atomic Layer Deposition on Composite Electrodes for Highly Durable and Safe Li-Ion Batteries," Yoon Seok Jung, Andrew S. Cavanagh, Leah A. Riley, Sun-Ho Kang, Anne C. Dillon, Markus D. Groner, Steven M. George, and Se-Hee Lee, *Advanced Materials*, 22, 1-5 (2010).
14. "Nanocomposite Counter-Electrode Materials for Electrochromic Windows," Dane Gillaspie, Andrew Norman, C. Tracy, J. Pitts, Se-Hee Lee, and Anne C. Dillon, *J. Electrochem. Soc.*, 157, H328 (2010).
15. "Enhanced Stability of LiCoO_2 Cathodes in Lithium-ion Batteries Using Surface Modification by Atomic Layer Deposition," Yoon S. Jung, Andrew S. Cavanagh, Anne C. Dillon, Markus D. Groner, Steven M. George, and Se-Hee Lee, *J. Electrochem. Soc.*, 157, A75 (2010).
16. "Optimization of MoO_3 Nanoparticles as Negative-Electrode Material in High-Capacity Lithium Ion Batteries," Leah A. Riley, Se-Hee Lee, Lynn Gedvillias, and Anne C. Dillon, *J. Power Sources*, 195, 588 (2010).
17. "Pd-Pt Alloy as a Catalyst in Gasochromic Thin films for Hydrogen Sensors," Jae Young Shim, Jae Dong Lee, Jung Mo Jin, Hyeonsik Cheong, and Se-Hee Lee, *Solar Energy Materials and Solar Cells*, 93, 2133 (2009).
18. "Glass-ceramic $\text{Li}_2\text{S}-\text{P}_2\text{S}_5$ electrolytes prepared by a single step ball milling process and their application for all-solid-state lithium-ion batteries," James Trevey, Jum Suk Jang, Yoon Seok Jung, and Se-Hee Lee, *Electrochem. Comm.*, 11, 1830 (2009).
19. "Metal Oxide Nanoparticles for Advanced Energy Applications," Se-Hee Lee, Rohit.

- Deshpande, Daniel Benhammou, Phil A. Parilla, A. Harv Mahan, and Anne C. Dillon, *Thin Solid Films*, 517, 3591 (2009).
20. "Flexible Electrochromic Devices Based on Crystalline WO_3 Nanostructures Produced with Hot-Wire Chemical Vapor Deposition," Christine M. White, Dane T. Gillaspie, Erin Whitney, Se-Hee Lee, and Anne C. Dillon, *Thin Solid Films*, 517, 3596 (2009).
 21. "Comparison of Pd, Pt and Pt/Pd as Catalysts for Hydrogen Sensor Films," J. Y Shim, J. D. Lee, J. M. Jin, H. Cheong, and S.-H. Lee, *Journal of the Korean Physical Society*, 55, 6, 2693-2696 (2009).
 22. "Electrochemical Reactivity of Ball-milled MoO_{3-y} Powders as Anode for Lithium Secondary Batteries," Yoon S. Jung, Sangkyoo Lee, Dongjoon Ahn, Anne C. Dillon, and Se-Hee Lee, *J. Power Sources*, 188, 286 (2009).
 23. "Novel memory effect in proton-based WO_3 electrochromic devices," Y. Zhang, S.-H. Lee, A. Mascarenhas, and S. K. Deb, *Appl. Phys. Lett.*, 93, 203508 (2008).
 24. "Reversible Lithium-ion Insertion in Molybdenum Oxide Nanoparticles," S.-H. Lee, R. Deshpande, P. A. Parilla, K. M. Jones, B. To, A. H. Mahan, and A. C. Dillon, *Advanced Materials*, 20, 3627-3632 (2008).
 25. "Metal oxide nano-particles for improved electrochromic and lithium-ion battery technologies," A. C Dillon, A. H. Mahan, R. Deshpande, P. A. Parilla, K. M. Jones, and S.-H. Lee, *Thin Solid Films*, 516, 794 (2008).
 26. "Electrochromic properties of Ni oxide thin films in diluted acidic electrolytes and their stability," Y. Abe, S.-H. Lee, E. O. Zayim, C. E. Tracy, J. R. Pitts, and S. K. Deb, *Solar Energy Materials and Solar Cells*, 92, 160 (2008).
 27. "Color change of V_2O_5 thin films upon exposure to organic vapors," C. Seo, H. Cheong, and S.-H. Lee, *Solar Energy Materials and Solar Cells*, 92, 190 (2008).
 28. "Photoelectrochemical Properties of N-Incorporated ZnO Films Deposited by Reactive RF Magnetron Sputtering," K.-S. Ahn, Y. Yan, S.-H. Lee, T. Deutsch, J. Turner, C. L. Perkins, and M. Al-Jassim, *J. Electrochem. Soc.*, 154(9), B956 (2007).
 29. "The effect of thermal annealing on photoelectrochemical responses of WO_3 thin films," K.-S. Ahn, S.-H. Lee, Anne C. Dillon, C. Edwin Tracy, and R. Pitts, *J. Appl. Phys.*, 101, 093524 (2007).
 30. "Optimization of crystalline tungsten-oxide nanoparticles for improved electrochromic applications," R. Deshpande, S.-H. Lee, P. A. Parilla, K. M. Jones, B. To, A. H. Mahan, J. D. Perkins, S. Mitra, and A.C. Dillon, *Solid State Ionics*, 178, 895 (2007).
 31. "Effect of O_2 flow concentration during reactive sputtering of Ni oxide thin films on their electrochemical and electrochromic properties in KCl and KOH electrolytes," Y. Abe, S.-H. Lee, E. O. Zayim, C. E. Tracy, J. R. Pitts, and S. K. Deb, *Japanese Journal of Applied Physics*, 45(10A), 7780 (2006).
 32. "Photochromic mechanism in a- WO_3 thin films based on Raman spectroscopic studies," K. Kim, C. Seo, H. Cheong, and S.-H. Lee, *Journal of the Korean Physical Society* 48, 1657 (2006).
 33. "Nanostructured manganese oxides as lithium battery cathode materials," P. Liu, S.-H. Lee, Y. Yan, C. E. Tracy, and J. A. Turner, *Journal of Power Sources*, 158 659 (2006).
 34. "Electrochromic properties of sputtered Ni oxide thin films in acidic KCl + H_2SO_4 aqueous solutions," Y. Abe, S.-H. Lee, C. E. Tracy, J. R. Pitts, and S. K. Deb, *Electrochemical and Solid-State Letters*, 9 (8) J31 (2006).
 35. "Hot-wire Chemical Vapor Synthesis for a Variety of Nano-materials with Novel Applications," A. C. Dillon, A. H. Mahan, R. Deshpande, C. Entrakul, J. L. Alleman, J. L. Blackburn, K. E. H. Gilbert, M. J. Heben, P. A. Parillia, K. M. Jones, R. To, S.-H. Lee, and J. H. Lehman, *Thin Solid Films*, 501, 216 (2006).
 36. "Crystalline WO_3 Nanoparticles for Highly Improved Electrochromic Applications," S.-

- H. Lee, R. Deshpande, P. A. Parilla, K. M. Jones, B. To, A. H. Mahan, and A. C. Dillon, *Advanced Materials*, 18, 763 (2006).
37. "Electrochromic properties of sputtered Ni oxide thin films in Neutral KCl electrolytes," Y. Abe, S.-H. Lee, C. E. Tracy, and J. R. Pitts, *Electrochemical and Solid-State Letters*, 9 (1) G17 (2006).
 38. "Hydrogen Sensors Based on Gasochromic Oxide Thin Films," H. Cheong, H. C. Jo, K. M. Kim, and S.-H. Lee, *Journal of the Korean Physical Society* 46, S121-124 (2005).
 39. "In-situ Raman spectroscopy of $\text{RuO}_2 \cdot x\text{H}_2\text{O}$," H. C. Jo, K. M. Kim, H. Cheong, S.-H. Lee, and S. K. Deb, *Electrochemical and Solid-State Letters*, 8 (4) E39 (2005).
 40. "Solid-state nano-composite electrochromic pseudocapacitors," S.-H. Lee, C. E. Tracy, Y. Yan, J. R. Pitts, and S. K. Deb, *Electrochemical and Solid-State Letters*, 8 (4) A188 (2005).
 41. "Identification of Nitrogen Chemical States in N-doped ZnO via X-ray Photoelectron Spectroscopy," C. L. Perkins, S.-H. Lee, X. Li, S. E. Asher, and T. J. Coutts, *J. Appl. Phys.* 97, 034907 (2005).
 42. "Electrochemical transformation of single-walled carbon nanotube/Nafion composite," P. Liu, S.-H. Lee, Y. Yan, T. Gennett, B. J. Landi, A. C. Dillon, and M. J. Heben, *Electrochemical and Solid-State Letters*, 7 (11) A421 (2004).
 43. "Effect of Non-stoichiometry of Nickel Oxides on Their Supercapacitor Behavior," S.-H. Lee, C. E. Tracy, and J. R. Pitts, *Electrochemical and Solid-State Letters*, 7 (10) A299 (2004).
 44. "Lithium Thin Film Battery with a Reversed Structural Configuration SS/Li/Lipon/ $\text{Li}_x\text{V}_2\text{O}_5/\text{Cu}$," S.-H. Lee, P. Liu, and C. E. Tracy, *Electrochemical and Solid-State Letters*, 6 (12) A275 (2003).
 45. "Electrochromism of Amorphous Ruthenium Oxide Thin Films," S.-H. Lee, P. Liu, H. M. Cheong, C. E. Tracy, and S. K. Deb, *Solid State Ionics*, 165, 217 (2003).
 46. "Electrochromic and Chemochromic Performance of Mesoporous Thin-Film Vanadium Oxide," P. Liu, S.-H. Lee, C. E. Tracy, J. A. Turner, J. R. Pitts, and S. K. Deb, *Solid State Ionics*, 165, 223 (2003).
 47. "Mesoporous Sol-gel WO_3 Thin Films via Poly(styrene-co-allyl-alcohol) Copolymer Templates," E. O. Zayim, P. Liu, S.-H. Lee, C. E. Tracy, J. A. Turner, J. R. Pitts, and S. K. Deb, *Solid State Ionics*, 165, 65 (2003).
 48. "Improving the Durability of Ion Insertion Materials in a Liquid Electrolyte," S.-H. Lee, H. M. Cheong, P. Liu, C. E. Tracy, J. R. Pitts, and S. K. Deb, *Solid State Ionics*, 165, 81 (2003).
 49. "Raman Spectroscopic Studies of Amorphous Vanadium Oxide Thin Films," S.-H. Lee, H. M. Cheong, M. J. Seong, P. Liu, C. E. Tracy, A. Mascarenhas, J. R. Pitts, and S. K. Deb, *Solid State Ionics*, 165, 111 (2003).
 50. "Comparison of Electrochromic Amorphous and Crystalline Tungsten Oxide Films," E. Ozkan, S.-H. Lee, C. E. Tracy, F. Z. Tepehan, J. R. Pitts, and S. K. Deb, *Solar Energy Materials and Solar Cells*, 79, 439 (2003).
 51. "Stable Cycling of Thin-Film Vanadium Oxide Electrodes between 4 and 0 V in Lithium Batteries," P. Liu, S.-H. Lee, C. E. Tracy, and J. A. Turner, *J. Power Sources*, 119-121, 305 (2003).
 52. "Improving the Durability of Amorphous Vanadium Oxide Thin Film Electrode in a Liquid Electrolyte," S.-H. Lee, P. Liu, H. M. Cheong, and C. E. Tracy, *Electrochemical and Solid-State Letters*, 6 (6) A102 (2003).
 53. "Electrochemical Deposition of Mesostructured Vanadium oxides and Vanadophosphates," P. Liu, Y. Yan, S.-H. Lee, C. Edwin Tracy, and John A. Turner, *J. Mater. Sci. Lett.*, 22, 489 (2003).

54. "Electrochemical Supercapacitors for Optical Modulation," S.-H. Lee, P. Liu, H. M. Cheong, C. E. Tracy, and S. K. Deb, *Electrochemical and Solid-State Letters*, 6 (2) A40 (2003).
55. "Effect of Crystallinity on Electrochromic Mechanism of Li_xWO_3 Thin Films," S.-H. Lee, M. J. Seong, H. M. Cheong, C. E. Tracy, and S. K. Deb, *Solid State Ionics*, 156, 447 (2003).
56. "Microstructure Study of Amorphous Vanadium Oxide Thin Films Using Raman Spectroscopy," S.-H. Lee, H. M. Cheong, M. J. Seong, P. Liu, C. E. Tracy, A. Mascarenhas, J. R. Pitts, and S. K. Deb, *J. Appl. Phys.*, 92 (4), 1893 (2002).
57. "Electrochromic and Optical Properties of Mesoporous Tungsten Oxide Films," E. Ozkan, S.-H. Lee, P. Liu, C. E. Tracy, F. Z. Tepehan, J. R. Pitts, and S. K. Deb, *Solid State Ionics*, 149, 139 (2002).
58. "Stable $\text{Pd/V}_2\text{O}_5$ Optical H_2 Sensor," P. Liu, S.-H. Lee, H. M. Cheong, C. E. Tracy, and J. R. Pitts, *J. Electrochem. Soc.*, 149, H76 (2002).
59. "Raman Spectroscopic Studies of Electrochromic $\alpha\text{-MoO}_3$ Thin Films," S.-H. Lee, M. J. Seong, C. E. Tracy, A. Mascarenhas, J. R. Pitts, and S. K. Deb, *Solid State Ionics*, 147, 129 (2002).
60. "Preparation and Lithium Insertion Properties of Mesoporous Vanadium Oxide," P. Liu, S.-H. Lee, C. E. Tracy, Y. Yan, and J. A. Turner, *Advanced Materials*, 14, 27 (2002).
61. "Influence of Microstructure on the Chemical Diffusion of Lithium Ions in Amorphous Lithiated Tungsten Oxide Films," S.-H. Lee, H. M. Cheong, C. E. Tracy, A. Mascarenhas, J. R. Pitts, G. Jorgensen, and S. K. Deb, *Electrochimica Acta*, 46, 3415 (2001).
62. "Raman Spectroscopic Studies of Ni-W Oxide Thin Films," S.-H. Lee, H. M. Cheong, N.-G. Park, C. E. Tracy, A. Mascarenhas, D. K. Benson, and S. K. Deb, *Solid State Ionics*, 140/1-2, 135 (2001).
63. "Evidence for Light-Induced Long-Range Hydrogen Motion in $\alpha\text{-Si:H}$ using Raman Scattering of $\alpha\text{-WO}_3$," H. M. Cheong, S.-H. Lee, B. Nelson, and S. K. Deb, *Electrochimica Acta*, 46, 1963 (2001).
64. "Raman Spectroscopic Studies of Gasochromic $\alpha\text{-WO}_3$ Thin Films," S.-H. Lee, H. M. Cheong, P. Liu, D. Smith, C. E. Tracy, A. Mascarenhas, J. R. Pitts, and S. K. Deb, *Electrochimica Acta*, 46, 1995 (2001).
65. "Cyclic Environmental Testing of Electrochromic Window Devices," S.-H. Lee, C. E. Tracy, J. R. Pitts, G. Jorgensen, and S. K. Deb, *Electrochimica Acta*, 46, 2237 (2001).
66. "Stand-alone Photovoltaic Powered Electrochromic Window," S. K. Deb, S.-H. Lee, C. E. Tracy, J. R. Pitts, B. Gregg, and H. M. Branz, *Electrochimica Acta*, 46, 2125 (2001).
67. "Light-induced Long-Range Hydrogen Motion in $\alpha\text{-Si:H}$ at Room Temperature," H. M. Cheong, S.-H. Lee, B. P. Nelson, A. Mascarenhas, and S. K. Deb, *Appl. Phys. Lett.*, 77 (17), 2686 (2000).
68. "Gasochromic Mechanism in $\alpha\text{-WO}_3$ Thin Films Based on Raman Spectroscopic Studies," S.-H. Lee, H. M. Cheong, P. Liu, D. Smith, C. E. Tracy, J. R. Pitts, and S. K. Deb, *J. Appl. Phys.*, 88 (5), 3076 (2000).
69. "Alternating Current Impedance and Raman Spectroscopic Study on Electrochromic $\alpha\text{-WO}_3$ Films," S.-H. Lee, H. M. Cheong, C. E. Tracy, A. Mascarenhas, J. R. Pitts, G. Jorgensen, and S. K. Deb, *Appl. Phys. Lett.*, 76 (26), 3908 (2000).
70. "Approaches for Large-Area $\alpha\text{-SiC:H}$ Photovoltaic-Powered Electrochromic Window Coatings," W. Gao, P. Liu, R. S. Crandall, S.-H. Lee, D. K. Benson, and H. M. Branz, *J. Non-Cryst. Solids*, 266-269, 1140 (2000).
71. "Novel Electrochromic Projection and Writing Device Incorporating an Amorphous Silicon Carbide Photodiode," W. Gao, S.-H. Lee, D. K. Benson, and H. M. Branz, *J. Non-*

- Cryst. Solids, 266-269, 1233 (2000).
72. "Raman Spectroscopic Studies of Electrochromic α -WO₃," S.-H. Lee, H. M. Cheong, C. E. Tracy, A. Mascarenhas, D. K. Benson, and S. K. Deb, *Electrochimica Acta*, 44, 3111, (1999).
 73. "Electrochromic Coloration Efficiency of α -WO_{3-y} Thin Films as a Function of Oxygen Deficiency," S.-H. Lee, H. M. Cheong, C. E. Tracy, A. Mascarenhas, A. W. Czanderna, and S. K. Deb, *Appl. Phys. Lett.*, 75 (11), 1541 (1999).
 74. "All-Solid-State Rocking-Chair Lithium Battery on a Flexible Al Substrate," S.-H. Lee, P. Liu, C. E. Tracy, and D. K. Benson, *Electrochemical and Solid-State Letters*, 2 (9) 425 (1999).
 75. "First α -SiC:H Photovoltaic-Powered Monolithic Tandem Electrochromic Window Device," W. Gao, S.-H. Lee, J. Bullock, Y. Xu, D. K. Benson, S. Morrison, and H. M. Branz, *Solar Energy Materials and Solar Cells*, 59, 243 (1999).
 76. "Electrochromic Mechanism in α -WO_{3-y} Thin Films," S.-H. Lee, H. M. Cheong, J.-G. Zhang, A. Mascarenhas, D. K. Benson, and S. K. Deb, *Appl. Phys. Lett.*, 74 (2), 242 (1999).
 77. "All-Solid-State Lithium Thin Film Rechargeable Battery with Lithium Manganese Oxide," Y.-S. Park, S.-H. Lee, B.-I. Lee, and S.-K. Joo, *Electrochemical and Solid-State Letters*, 2 (2) 58 (1999).
 78. "Monolithic, Self-powered Photovoltaic-Electrochromic Coating for Windows," S.-H. Lee, W. Gao, C. E. Tracy, H. M. Branz, D. K. Benson, and S. K. Deb, *J. Electrochem. Soc.*, 145, 3545 (1998).
 79. "Characterization of Ni-W Oxide Thin Film Electrodes," S.-H. Lee, Y.-S. Park, and S.-K. Joo, *Solid State Ionics*, 109 (3-4), 303 (1998).
 80. "Electrochromic Behavior of Ni-W Oxide Electrodes," S.-H. Lee and S.-K. Joo, *Solar Energy Materials and Solar Cells*. 39, 155 (1995).
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 82. "Characterization of Sputtered-deposited LiMn₂O₄ Thin Films for Rechargeable Microbatteries," K.-H. Hwang, S.-H. Lee, and S.-K. Joo, *J. Electrochem. Soc.*, 141, 3296 (1994).

PUBLICATIONS (Conference Proceedings)

1. "Li₂S-P₂S₅ Based Solid State Electrolytes for Lithium Ion Battery Applications," James Trevey, Yoon Seok Jung, Se-Hee Lee, *ECS Transactions*, 16(29), 181 (2009).
2. "Hot-Wire Chemical Vapor Deposition of WO₃ and MoO₃ Nanoparticles and the Performance of Nanostructured WO₃ Electrochromic Films Deshpande," R. Deshpande; S.-H. Lee, P. A. Parilla, K. M. Jones, A. H. Mahan, B. To, S. Mitra, A. C. Dillon, *ECS Transactions*. Vol. 2(20), 25-32 (2007).
3. "Protective coatings for Pd-based hydrogen sensors," R. D. Smith, S.-H. Lee, C. E. Tracy, and J. R. Pitts, *ABSTRACTS OF PAPERS OF THE AMERICAN CHEMICAL SOCIETY*, 228 U686-U687 222-FUEL Part 1, AUG 22 (2004).
4. "Solid-State Nano-Composite Supercapacitors for Optical Modulation," Lee, S. H.; Yan, Y.; Tracy, C. E.; Pitts, J. R.; Deb, S. K. Gumbles, G.; Lian, T.; Murakoshi, K., eds. *Electron Transfer in Nanomaterials: Proceedings of the International Symposium on Charge Transfer Processes in Semiconductor and Metal Nanoparticles held at the 205th Meeting of the Electrochemical Society, 9-14 May 2004, San Antonio, Texas*. Electrochemical Society Proceedings Volume 2004-22. Pennington, NJ: The

- Electrochemical Society, Inc. pp. 225-234.
5. "Advances in Fiber Optic Hydrogen Sensor Technology," Smith, R. D.; Pitts, J. R.; Lee, S. H.; Tracy, E. A.A.M. Sayigh, ed. Proceedings of the World Renewable Energy Congress VIII (WREC 2004), 29 August--3 September 2004, Denver, Colorado (CD-ROM). [Amsterdam]: Elsevier, Ltd.; Monterey, CA: Produced by InControl Productions, Inc. 5 pp.
 6. "Effective Nitrogen Doping of Zinc Oxide," Lee, S. H.; Yan, Y.; Yoon, S.; Perkins, C.; Tracy, E.; Pitts, J. R. Ng, H. M.; Baca, A. G., eds. State-of-the-Art Program on Compound Semiconductors XLI and Nitride and Wide Bandgap Semiconductors for Sensors, Photonics and Electronics V : Proceedings of the International Symposia, October 2004, Honolulu, Hawaii. Electrochemical Society Proceedings, Vol. 2004-06. Pennington, NJ: Electrochemical Society pp. 312-319.
 7. "Protective coatings for Pd-based hydrogen sensors," R. D. Smith, S.-H. Lee, C. E. Tracy, and J. R. Pitts, ABSTRACTS OF PAPERS OF THE AMERICAN CHEMICAL SOCIETY, 228 U686-U687 222-FUEL Part 1, AUG 22 (2004).
 8. "Mesoporous Vanadium Oxide as Cathodes for Lithium Batteries," Nazri, Liu, P.; Lee, S.-H.; Tracy, E. C.; Turner, J. A. G. -A., et al. eds Advanced Batteries and Super Capacitors: Proceedings of the International Symposium of the Electrochemical Society and the International Society for Electrochemistry, Fall 2001, San Francisco, California. Electrochemical Society Proceedings Volume 2001-21. Pennington, NJ: Electrochemical Society pp. 183-187; NREL Report No. CP-590-35522.
 9. "Low-Cost Fiber Optic Hydrogen Sensors," R. D. Smith, P. Liu, S.-H. Lee, C. E. Tracy, and J. R. Pitts, ABSTRACTS OF PAPERS OF THE AMERICAN CHEMICAL SOCIETY 224 171-FUEL Part 1 (2002).
 10. "Interfacial Stability of Thin Film Hydrogen Sensors," J. R. Pitts, P. Liu, S.-H. Lee, E. Tracy, R. D. Smith, and C. Salter, Proceedings of the 2001 US DOE Annual Hydrogen Program Review Meeting,
 11. "Lithium Insertion in Tungsten Oxide Thin Films," S.-H. Lee, M. J. Seong, E. Ozkan, C. E. Tracy, F. Z. Tepehan, and S. K. Deb, Proc. SPIE Int. Soc. Opt. Eng. 4458, 194 (2001).
 12. "Optical and Electrochromic Properties of Amorphous and Crystalline Tungsten Oxide Films," E Ozkan, S.-H. Lee, C. E. Tracy, F. Z. Tepehan, J. R. Pitts, and S. K. Deb, Proc. SPIE Int. Soc. Opt. Eng. 4458, 203 (2001).
 13. "Optical and Electrochromic Properties of Sol-gel Deposited Tungsten oxide Films," E. Ozkan, S.-H. Lee, P. Liu, C. E. Tracy, Z. F. Tepehan, J. R. Pitts, and S. K. Deb, Proc. SPIE Int. Soc. Opt. Eng. 4458, 175 (2001).
 14. "Evidence for Long-range Hydrogen Motion in a-Si:H under Room-temperature Illumination Using Raman Scattering of Amorphous Tungsten Oxide Overlayer," H. M. Cheong, S.-H. Lee, B. Nelson, A. Mascarenhas, and S. K. Deb, Proceedings of the Materials Research Society Symposium, 16-20 April 2001, San Francisco, California. Materials Research Society Symposium Proceedings, Vol. Materials Research Society.
 15. "Metal Oxide Stabilized Palladium Sensor for Hydrogen Detection," Liu, P.; Lee, S. H.; Tracy, C. E.; Pitts, J. R.; Smith, R. D. Wachsman, E. D., et al., eds. Solid-State Ionic Devices II--Ceramic Sensors: Proceedings of the International Symposium at the 198th Electrochemical Society Meeting, 22-27 October 2000, Phoenix, Arizona. Electrochemical Society Proceedings Vol. 2000-32. Pennington, NJ: The Electrochemical Society, Inc. pp. 445-454.
 16. "Lithium Insertion in Tungsten Oxide Thin Films," Lee, S. H.; Seong, M. J.; Ozcan, E.; Tracy, C. E.; Tepehan, Z. F.; Deb, S. K. Lampert, C. M.; Granqvist, C. G.; Lewis, K. L., eds. Solar and Switching Materials: Proceedings of the Conference, 1-2 August 2001, San

- Diego, California. Proceedings of SPIE Vol. 4458. Bellingham, WA: SPIE--The International Society for Optical Engineering pp. 194-202.
17. "Optical and Electrochromic Properties of Amorphous and Crystalline Tungsten Oxide Films," Ozkan, E.; Lee, S. H.; Tracy, C. E.; Tepehan, F. Z.; Pitts, J. R.; Deb, S. K. Lampert, C. M.; Granqvist, C. G.; Lewis, K. L., eds. Solar and Switching Materials: Proceedings of the Conference, 1-2 August 2001, San Diego, California. Proceedings of SPIE Vol. 4458. Bellingham, WA: SPIE--The International Society for Optical Engineering pp. 203-210.
 18. "Optical and Electrochromic Properties of Sol-gel Deposited Tungsten Oxide Films," Ozkan, E.; Lee, S. H.; Liu, P.; Tracy, C. E.; Tepehan, F. Z.; Pitts, J. R.; Deb, S. K. Lampert, C. M.; Granqvist, C. G.; Lewis, K. L., eds. Solar and Switching Materials: Proceedings of the Conference, 1-2 August 2001, San Diego, California. Proceedings of SPIE Vol. 4458. Bellingham, WA: SPIE--The International Society for Optical Engineering pp. 175-185.
 19. "Interfacial Stability of Thin Film Hydrogen Sensors," J. R. Pitts, P. Liu, S.-H. Lee, E. Tracy, R. D. Smith, and C. Salter, Proceedings of the 2000 US DOE Annual Hydrogen Program Review Meeting, San Ramon, CA, May 9-11 (2000).
 20. "Self-Powered Electrochromic Coatings," Proceedings of the SPIE Conference on Switchable Materials and Flat Panel Displays, Pichot, F.; Gao, W.; Gregg, B. A.; Ferrere, S.; Lee, S. H.; Bullock, J.; Xu, Y.; Pitts, R. J.; Tracy, C.; Morrison, S.; Deb, S. K.; Benson, D. K.; Branz, H. M. July 1999, Denver, Colorado. SPIE- The International Society for Optical Engineering, Vol. 3788. Bellingham, WA: SPIE - The International Society for Optical Engineering pp. 59-68.
 21. "Low-Cost Fiber-Optic Chemochromic Hydrogen Gas Detector," Benson, D. K.; Tracy, C. E.; Hishmeh, G. A.; Ciszek, P. A.; Lee, S.-H.; Pitts, R.; Haberman, D. P. Proceedings of the 1999 U.S. DOE Hydrogen Program Review, 4-6 May 1999, Lakewood, Colorado. NREL/CP-570-26938. Golden, CO: National Renewable Energy Laboratory Vol. II: pp. 565-579.
 22. "Self-powered Electrochromic Coatings," F. Pichot, W. Gao, B. A. Gregg, S. Ferrere, S.-H. Lee, J. Bullock, Y. Xu, R. J. Pitts, C. E. Tracy, S. Morrison, S. K. Deb, D. K. Benson, and H. M. Branz, Proc. SPIE Int. Soc. Opt. Eng. 3788, 59 (1999).
 23. "Low-cost fiber optic hydrogen gas detector using guided-wave surface-plasmon resonance in chemochromic thin films," D. K. Benson, C. E. Tracy, G. A. Hishmeh, P. E. Ciszek, S.-H. Lee, and D. P. Haberman, Proc. SPIE Int. Soc. Opt. Eng. 3535, 185 (1999).
 24. "First Monolithic Tandem Photovoltaic-Powered Electrochromic Smart Window," W. Gao, S.-H. Lee, Y. Xu, S. Morrison, D. K. Benson, and H. M. Branz, (1999). Schropp, R., et al., eds. Amorphous and Microcrystalline Silicon Technology 1998: Proceedings of the Materials Research Society Symposium, 14-17 April 1998, San Francisco, California. Materials Research Society Symposium Proceedings, Vol. 507. Warrendale, PA: Materials Research Society; pp. 345-350.
 25. "Wide-Gap a-SiC:H PV-Powered Electrochromic Window Coating," W. Gao, S.-H. Lee, Y. Xu, D. K. Benson, S. K. Deb, and H. M. Branz, (1998). Schmid, J., et al., eds. 2nd World Conference on Photovoltaic Solar Energy Conversion: Proceedings of the International Conference, 6-10 July 1998, Vienna, Austria. Italy: European Commission; Vol. I: pp. 234-237.
 26. "Low-Cost Fiber-Optic Chemochromic Hydrogen Detector," D. K. Benson, C. E. Tracy, G. Hishmeh, P. Ciszek, S.-H. Lee, (1998). Proceedings of the 1998 U.S. DOE Hydrogen Program Review, 28-30 April 1998, Alexandria, Virginia. NREL/CP-570-25315. Golden, CO: National Renewable Energy Laboratory; Vol. I: pp. 89-113.
 27. "A Wide-Gap a-SiC:H PV-Powered Electrochromic Window Coating," W. Gao, S.-H.

- Lee, Y. Xu, D. K. Benson, S. K. Deb, H. M. Branz, (1998). 5 pp.
28. "A New Lithium Based Counter Electrochromic Material for Fast Optical Response," S.-H. Lee, B.-I. Lee, and S.-K. Joo, in: K.-C. Ho, C. B. Greenberg, D. A. Macarthur (Eds). Proceedings of the Third Symposium on Electrochromic Materials, Vol. 96-24, pp. 191-205, The Electrochemical Society, Pennington, (1997).
 29. "New Transparent Polymeric Solid Electrolyte for All Solid State Electrochromic System," S.-H. Lee, K.-H. Hwang, and S.-K. Joo, in: K.-C. Ho, C. B. Greenberg, D. A. Macarthur (Eds). Proceedings of the Symposium on Electrochromic Materials II, Vol. 94-2, pp. 290-302, The Electrochemical Society, Pennington, (1994).

PATENTS

1. "Method for Improving the Durability of Ion Insertion Materials," US patent (6,420,071) July 16, 2002
2. "Pd/Ni-WO₃, Anodic Double Layer Gasochromic Device," US patent (6,723,566) April 20, 2004
3. "Buried Anode Lithium Thin Film Battery and Process for Forming the Same," US patent (6,805,999) October 19, 2004
4. "Electrochromic counter electrode," US patent (6,859,297) February 22, 2005
5. "Hydrogen Permeable Protective Coating for a Catalytic Surface," US patent (7,233,034) June 19, 2007
6. "Pd/V₂O₅ device for colorimetric H₂ detection," US patent (7,419,635 B2) September 2, 2008
7. "Thin film buried anode battery," US patent (7,632,602) December 15, 2009
8. "Nano-composite Materials," US patent (7,722,966) May 25, 2010
9. "Method for Catalytic Surface Protection," US patent pending (20070231466)
10. "H₂O doped WO₃, ultra-fast, high-sensitivity hydrogen sensors," US patent pending (20040023595).
11. "An Amorphous Carbon Coating for Sensor Protection," US patent pending.
12. "Nano-composite supercapacitor materials," US patent pending.
13. "Nanoparticle Electrode Materials," US patent pending.
14. "Flexible Thin Film Solid State Lithium Ion Batteries," US patent pending.
15. "Homogeneous, Dual Layer, Solid State, Thin Film Deposition for Structural and/or Electrochemical Characteristics" US patent pending.

INVITED TALKS

1. "ALD for Improved Li-ion Batteries," 10th International Conference on Atomic Layer Deposition, Seoul Korea, June 20-23, 2010.
2. "Direct atomic layer deposition on the composite electrode for lithium-ion batteries," The 6th Petite Workshop on Defect Chemical nature of Energy Materials, Damyang, Korea, September 6-9, 2009.
3. "Alternative Energy" 2008 Japan-America Frontiers of Engineering Symposium in the session entitled, November 17-19, 2008 (Monday - Wednesday) in Tsukuba International Congress Center in Tsukuba, Japan (Invited talk).
4. "Nanostructured Metal Oxides for Energy Applications," The Fifth International Conference on Hot-Wire Chemical Vapor Deposition (HWCVD, Cat-CVD) August 20-24, 2008 in Cambridge, MA, USA.
5. "Polymer derived ceramics for lithium-ion batteries," MS&T-08 (Oct 5-9, 2008, Pittsburgh, PA).

6. "Nanostructured molybdenum oxide as a negative electrode materials for lithium-ion batteries," MRS fall meeting, Boston 2007.
7. "Nanostructured Metal Oxides for Improved Energy Storage Devices," Argonne National Laboratory, September 27th, 2007.
8. "Metal Oxide Nanoparticles for Improved Electrochromic and Lithium-Ion Battery Technologies," U.S.-Korea Forums on Nanotechnology, April 26th & 27th, Honolulu, HI 2007.
9. "Metal Oxide Nanoparticles for Battery and Electrochromic Applications," Se-Hee Lee, et al. The 1st NanoScience & Applications Conference, NIST October 16-19, 2005 Boulder CO.
10. "Electrochromic Materials and Device Research - Some Challenges and Opportunities," SKC Korea, May 12, 2005.

RESEARCH FUNDING

Project Title	Funding Agency	Period
Atomic Layer Deposition for Stabilization of Amorphous Silicon Anodes	DOE	10/10-9/13
Nanostructured Solid-State Composite Batteries (Phase II)	DARPA DSO	1/10 - 6/11
Multiphysics for the Structural Integration of Li-ion Batteries	AF-MURI	1/10 – 6/11
Embedded Batteries (iMINT target research)	iMINT, IBIDEN	6/09 – 5/11
Solid-State Nanostructured Batteries: Anode Optimization for Unsurpassed Performance and Reliability.	CU-TTO POCg	6/09 – 5/10
Novel Silicon/Ni _x Sn _{1-x} Core-Shell Nanowires for Superior High Capacity and Long Lifetime Lithium-Ion Batteries	CU-IGP	2/09 – 1/10
Nanostructured 3-D Solid-State Rechargeable Batteries	SRC	10/08 – 9/09
Atomic Layer Deposition for High Energy and High Power Li-ion Batteries.	iMINT	3/08 – 2/09
New NanoDomain Materials for Photocatalytic Hydrogen Generation from Water	CU-IGP	2/08 – 1/09
Development of Advanced Li-Ion Batteries and Electrochromic Windows	NREL	4/08 - 3/11
Nanostructured Solid-State Composite Batteries (Phase I)	DARPA DSO	1/08 - 12/09
Novel ALD Coated Nanoparticle Anodes for Enhanced Performance Li-Ion Batteries (Phase I)	DOE STTR	1/08 - 6/09

TEACHING

Courses Taught

Spring 2008, Material Science 2 - Behavior (MCEN 5044 001)
Fall 2008, Energy Conversion and Storage (MCEN 4228 003, 5228 003)
Spring 2009, Material Science 2 - Behavior (MCEN 5044 001)
Fall 2009, Hybrid Materials for Sustainability (Seoul National University)
Spring 2010, Solid State Electronic Devices (Seoul National University)
Fall 2010, Energy Conversion and Storage (MCEN 4228 003, 5228 003)

Thesis Students

Current

Advisor for 5 current PhD students (Leah Riley, James Trevey, Isaac Scott, Tom Yersak, Jaeha Woo)

Committee Member for 1 current PhD student (Jonathan Metts, Aerospace PhD Candidate)

Committee Member for 1 MS student (Ben Maples, EE M.S. Candidate)

Supervisor for 1 International Exchange PhD student (Seoungbum Son from Seoul National University)

Completed

Committee Member for Dongjoon Ahn, PhD, Mech Engineering 2009 (*Advisor, R. Raj*)

Dissertation title: Polymer derived ceramics for Li-ion batteries

Advisor for Christine M. White, MS, Mech Engineering, August 2009 2

Dissertation title: Metal Oxide Materials for Energy Efficiency and Energy Storage

Advisor for Sangkyu Lee, MS, Mech Engineering, August 2009

Research topic: Li-ion Batteries

Misc. Advising

Undergraduate/graduate Independent Study (4), Faculty Advisor

Summer Undergraduate Research Experience (3), Faculty Advisor

SERVICE

- Founding Research Fellow at the RASEI (Renewable and Sustainable Energy Institute)
- World Class University Professor, Hybrid Materials Major at Seoul National University 2009-2012.
- Co-organizer for a symposium entitled “Nanostructured Materials for Energy Storage” at the Materials Research Society Meeting, April 2011.
- Lead Organizer for a symposium entitled “Solid-State Batteries” at the Materials Research Society Meeting, March 2010.
- Organizing Committee in MS&T-08 (Oct 5-9, 2008, Pittsburgh, PA).
- Scientific Committee in IME-8 (8th International Meeting on Electrochromism, Seoul Korea, Aug. 24-28, 2008).
- Program Committee in IME-5 (5th International Meeting on Electrochromism, Denver CO USA, Aug. 6-9, 2002).

Reviewer

Manuscripts – (review at least 5-6 manuscripts per year)

Advanced Materials, Nano Letters, Advanced Functional Materials, Journal of Electrochemical Society, Solid State Ionics, Journal of Power Sources, Angewandte Chemie,

Solar Energy Materials and Solar Cells, Electrochimica Acta, Journal of Materials Chemistry,
Applied Phys Letters.

Proposals – (review at least 3 proposals per year)
NSF, NSF SBIR, DOE, DOE SBIR, DOE STTR, AF.