**Alan W. Weimer**
Department of Chemical & Biological Engineering, University of Colorado, Boulder, CO 80309-0424
(ph: 303-492-3759, E-mail: alan.weimer@colorado.edu)
(http://www.colorado.edu/che/TeamWeimer/index.htm)

PROFESSIONAL EXPERIENCE

The University of Colorado (Boulder, CO)
1996-present: Professor, H.T. Sears Professor since 2006
The Dow Chemical Company (Midland, MI)
1980-1996: 5 promotions, including promotion to Associate Research Scientist (1995)
Licensed PE (State of Colorado)

EDUCATION

Ph.D., Chemical Engineering, University of Colorado, 1980
M.S., Chemical Engineering, University of Colorado, 1978
B.S., Chemical Engineering (Summa cum Laude), University of Cincinnati, 1976

HONORS AND AWARDS

- 2011 Excellence in Bio-Derived Technology Commercialization (Colorado Cleantech Industry Assoc.)
- 2010 AIChE Excellence in Process Development Research Award
- 2010 Dean's Award for Outstanding Research (College of Engineering and Applied Science)
- 2009 AIChE Thomas Baron Award in Fluid-Particle Systems
- 2007 University of Colorado Physical Science Company of the Year Award – ALD NanoSolutions
- 2006 Distinguished Engineering Alumni Award (University of Colorado)
- 2006 Frost & Sullivan Excellence in Technology Award (via ALD NanoSolutions, Inc.)
- 2006 Inducted into University of Colorado "Pinnacles of Inventorship" Group
- 2005 University of Colorado Boulder Faculty Assembly Excellence in Research, Scholarly and Creative Work Award
- 2005 University of Colorado College of Engineering and Applied Science Faculty Research Award
- 2005 United States Department of Energy Hydrogen Program R&D Award
- 2004 R & D 100 Award (Particle-ALD)
- 2004 University of Colorado (Boulder) Inventor of the Year Award
- 2004 AIChE Fellow
- 2000, 2001 Department of Chemical Engineering *Faculty Mentor* Award (by students)
- 1997 AIChE Particle Technology Forum *Fluidized Processes Recognition* Award
- 1995 Dow Chemical Company *Excellence in Science* Award
- 1994 Dow Chemical Company *Ceramics Technology Leadership* Special Recognition Award
- 1993 Dow Chemical Company Research *Inventor of the Year* Award
- 1993 Dow Chemical Company *Ceramics Milestone* Award
- 1993 Mid-Michigan AIChE *Professional Progress* Award
- 1992 Mid-Michigan Sigma Xi "*Best Published Scientific Paper of the Year* Award"
- 1991 *Distinguished Young Engineering Alumnus* (University of Cincinnati)
- 1990 Dow Chemical Company *Spangenberg Ceramics Founder's Award*
- 1976 University of Cincinnati *Herman Schneider Medal*

Five Recent Particle ALD Research Publications

(1) Liang, X.H., X. Lu, M. Yu, A.S. Cavanaugh, D.L. Gin, and A.W. Weimer, "Modification of Nanoporous supported Lyotropic Liquid Crystal Polymer Membranes by Atomic Layer Deposition," Journal of Membrane Science, 349, 1-5 (2010).
(2) Liang, X.H., N.-H. Li, and A.W. Weimer, "Template-directed Synthesis of Porous Alumina Particles

with Precise Wall Thickness Control via Atomic Layer Deposition," Microporous and Mesoporous Materials, 149, 106-110 (2012).

(3) Li, J., X.H. Liang, D.M. King, Y.-B. Jiang, and A.W. Weimer, "Highly Dispersed Pt Nanoparticle Catalyst Prepared by Atomic Layer Deposition," Applied Catalysis B – Environmental, 97, 220-226 (2010).

(4) Scheffe, J.R., J. Li, and A.W. Weimer, "A Spinel Ferrite/Hercynite Water-Splitting Redox Cycle," International Journal of Hydrogen Energy, 35, 3333-3340 (2010).

(5) Scheffe, J.R., M.D. Allendorf, E.N. Coker, B.W. Jacobs, A.H. McDaniel and A.W. Weimer, "Hydrogen Production via Chemical Looping Redox Cycles Using Atomic Layer Deposition-Synthesized Iron Oxide and Cobalt Ferrites," Chemistry of Materials," 23 (8), 2030-2038 (2011).

Five Most Relevant and Recent Solar-thermal Research Publications

(6) Piatkowski, N., C. Wieckert, A.W. Weimer and A. Steinfeld, "Solar-driven Gasification of Carbonaceous Feedstock – A Review," Energy & Environmental Science, 4, 73-82 (2011).

(7) Francis, T.M., P.R. Lichty, and A.W. Weimer, "Manganese Oxide Dissociation Kinetics for the $Mn_2O_3$ Thermochemical Water-splitting Cycle. Part I: Experimental," 65, 3709-3717 (2010) Chemical Engineering Science (2010).

(8) Steinfeld, A. and A.W. Weimer, "Thermochemical Production of Fuels with Concentrated Solar Energy," Optics Express, 18 (9), A100-A111 (2010).

(9) Lichty, P.R., C. Perkins, B. Woodruff, C. Bingham, and A.W. Weimer, "Rapid High-temperature Solar-thermal Biomass Gasification in a Prototype Cavity Reactor," Journal of Solar Energy Engineering, 132, 011012 (2010).

(10) Kreider, P.B., H.H. Funke, K. Cuche, M. Schmidt, A. Steinfeld and A.W. Weimer, "Manganese Oxide Based Thermochemical Hydrogen Production Cycle," International Journal of Hydrogen Energy," 36, 7028-7037 (2011).

PUBLICATIONS & PATENTS

- >130 published or in-press Refereed Publications
- 24 U.S. Patents (issued); 6 U.S. Patents (pending)
- 7 Edited AIChE Symposium Proceedings; 1 Edited Text; 1 Guest Edited AIChE Journal Issue; 1 Guest Edited Powder Technology Issue; 3 Text Chapters

SYNERGISTIC ACTIVITIES (Technical Supervisory Role)

- Founding Executive Director, Colorado Center for Biorefining and Biofuels ($C_2B_2$) www.c2b2web.org
- Chair (2004-2006), Vice-Chair & Treasurer (2000-2003) AIChE Particle Technology Forum
- Global Project Coordinator (www.iphe.net) "Solar-driven High Temperature Thermal Splitting of Water"
- Coordinating Editor, Journal of Nanoparticle Research (2006 – present)
- Editorial Board, Powder Technology (2005-present) and Journal of Nanomaterials (2006-present)
- Director, Materials Engineering and Sciences Division (MESD) of the AICHE 1997-1999
- Chair, National AIChE Area 8d (Ceramics) 1995-1996 and National AIChE Area 3b (Fluidization and Fluid-Particle Systems) 1990-1991
- Committee Chair, University of Colorado at Boulder Council on Research & Creative Work (2004/5)
- Co-founded ALD NanoSolutions, Inc. (www.ALDNanoSolutions.com) 2001 and Copernican Energy (co-founded in 2006, merged with Sundrop Fuels in 2008 - served as Chief Technical Officer for Sundrop Fuels from July, 2008 until the $155M investment by Chesapeake Energy for a 40% stake, July, 2011)

**Alan W. Weimer**
**(Peer Reviewed Publications)**

(1) Liang, X.H., N.-H. Li, and A.W. Weimer, "Template-directed Synthesis of Porous Alumina Particles with Precise Wall Thickness Control via Atomic Layer Deposition," Microporous and Mesoporous Materials, 149, 106-110 (2012).

(2) Liang, X.H., Y.-B. Jiang and A.W. Weimer, "Nanocoating Zinc Alkoxide (Zincone) Hybrid Polymer Films on Particles Using a Fluidized Bed Reactor," J. Vac. Sci. Technol. A, 30(1), Jan/Feb (2012).

(3) Piatkowski, N., C. Wieckert, A.W. Weimer, and A. Steinfeld, "Solar-driven Gasification of Carbonaceous Feedstock – A Review," Energy & Environmental Science," 4, 73-82 (2011).

(4) Kreider, P.B., H.H. Funke, K. Cuche, M. Schmidt, A. Steinfeld and A.W. Weimer, "Manganese Oxide Based Thermochemical Hydrogen Production Cycle," International Journal of Hydrogen Energy," 36, 7028-7037 (2011).

(5) Scheffe, J.R., M.D. Allendorf, E.N. Coker, B.W. Jacobs, A.H. McDaniel and A.W. Weimer, "Hydrogen Production via Chemical Looping Redox Cycles Using Atomic Layer Deposition-Synthesized Iron Oxide and Cobalt Ferrites," Chemistry of Materials," 23 (8), 2030-2038 (2011).

(6) Liang, X.H., Y. Zhou, J. Li, and A.W. Weimer, "Reaction Mechanism Studies for Platinum Nanoparticle Grown by Atomic Layer Deposition," Journal of Nanoparticle Research, 13, 3781-3788 (2011).

(7) Liang, X.H., J. Li, M.Yu, C.H. McMurray, J.L. Falconer, and A.W. Weimer, "Stabilization of Supported Metal Nanoparticles Using an Ultrathin Porous Shell," ACS Catalysis, 1, 1162-1165 (2011).

(8) Van Ommen, J.R., D.M. King, A.W. Weimer, R. Pfeffer and B.G.M. van Wachem, "Experiments and Modeling of Micro-jet Assisted Fluidization of Nanoparticles, in Kim, S.D., Lee, J.K., Seo, Y.C. (Eds), Proceedings of the 13th International Conference on Fluidization, pp. 479-486, Engineering Conference International, New York, ISBN 978-0-918902-57-3 (2010).

(9) Liang, X.H., K.S. Barrett, Y.-B. Jiang, and A.W. Weimer "Rapid Silica Atomic Layer Deposition on Large Quantities of Cohesive Nanoparticles," ACS Applied Materials and Interfaces, 2(8), 2248-2253 (2010).

(10) Zhou, Y., D.M. King, X.H. Liang, J. Li, and A.W. Weimer, "Optimal Preparation of Pt/TiO2 Photocatalysts Using Atomic Layer Deposition," Applied Catalysis B-Environmental, 101, 54-60 (2010).

(11) Zhou, Y., D.M. King, J. Li, K.S. Barrett, and A.W. Weimer, "Synthesis of Photoactive Magnetic Nanoparticles using Atomic Layer Deposition," Industrial and Engineering Chemistry Research, 49 (15), 6964-6971 (2010).

(12) Martinek, J, M. Channel, A. Lewandowski and A.W. Weimer, "Considerations for the Design of Solar-thermal Chemical Processes," Journal of Solar Energy Engineering, 132, 031013 (2010).

(13) Li, J., X.H. Liang, D.M. King, Y.-B. Jiang, and A.W. Weimer, "Highly Dispersed Pt Nanoparticle Catalyst Prepared by Atomic Layer Deposition," Applied Catalysis B – Environmental, 97, 220-226 (2010).

(14) Scheffe, J.R., J. Li, and A.W. Weimer, "A Spinel Ferrite/Hercynite Water-Splitting Redox Cycle," International Journal of Hydrogen Energy, 35, 3333-3340 (2010).

(15) Lichty, P.R., C. Perkins, B. Woodruff, C. Bingham, and A.W. Weimer, "Rapid High-temperature Solar-thermal Biomass Gasification in a Prototype Cavity Reactor," Journal of Solar Energy Engineering, 132, 011012 (2010).

(16) Liang, X.H., X. Lu, M. Yu, A.S. Cavanaugh, D.L. Gin, and A.W. Weimer, "Modification of Nanoporous supported Lyotropic Liquid Crystal Polymer Membranes by Atomic Layer Deposition," Journal of Membrane Science, 349, 1-5 (2010).

(17) Steinfeld, A. and A.W. Weimer, "Thermochemical Production of Fuels with Concentrated Solar Energy," Optics Express, 18 (9), A100-A111 (2010).

(18) Francis, T.M., P.R. Lichty, and A.W. Weimer, "Manganese Oxide Dissociation Kinetics for the $Mn_2O_3$ Thermochemical Water-splitting Cycle. Part I: Experimental," Chemical Engineering Science, 65, 3709-3717 (2010).

(19) Francis, T.M., P.R. Lichty, and A.W. Weimer, "Manganese Oxide Dissociation Kinetics for the $Mn_2O_3$ Thermochemical Water-splitting Cycle. Part II: CFD Model," Chemical Engineering Science, 65, 4397-4410 (2010).

(20) Francis, T.M., P.B. Kreider, P.R. Lichty, and A.W. Weimer, "An Investigation of a Fluidized Bed Solid Feeder for an Aerosol Flow Reactor," Powder Technology, 199, 70-76 (2010).

(21) Liang, X.H. and A.W. Weimer, "Photoactivity Passivation of TiO2 Nanoparticles using Molecular Layer Deposited (MLD) Polymer Films, Journal of Nanoparticle Research, 12, 135-142 (2010).

(22) Liang, X.H., M. Yu, J. Li, Y.-B. Jiang, and A. W. Weimer, "Ultra-thin Microporous/Mesorporous Metal Oxide Films Prepared by Molecular Layer Deposition (MLD)," Chemical Communications 7140-7142 (2009).

(23) Liang, X.H., A.D. Lynn, D.M. King, S.J. Bryant, and A.W. Weimer, "Biocompatible Interface Films Deposited within Porous Polymers by Atomic layer Deposition (ALD)," ACS Applied Materials & Interfaces, 1 (9), 1988-1995 (2009).

(24) Melchior, T., C. Perkins, P.R. Lichty, A.W. Weimer, and A. Steinfeld, "Solar-driven Biochar Gasification in a Particle-flow Reactor," Chemical Engineering and Processing, 48, 1279-1287 (2009).

(25) King, D.M., J.H. Li, X.H. Liang, S.I. Johnson, M.M. Channel, and A.W. Weimer, "Crystal Phase Evolution in Quantum Confined ZnO Domains on Particles via Atomic layer Deposition, " Crystal Growth & Design, 9(6), 2828-2834 (2009)

(26) Cavanagh, A.S., C.A. Wilson, A.W. Weimer, and S.M. George, "Atomic Layer Deposition on Gram Quantities of Multiwalled Carbon Nanotubes," Nanotechnology, 20, 255602 (2009).

(27) King, D.M., S.I. Johnson, J.Li, X. Du, X.H. Liang, and A.W. Weimer, "Atomic Layer Deposition of Quantum-confined ZnO Nanostructures," Nanotechnology, 20 (19), 195401 (2009).

(28) Haussener, S., D. Hirsch, C. Perkins, A. Lewandowski, A. Steinfeld, and A.W. Weimer, "Modeling of a Multi-tube High-temperature Solar Thermochemical Reactor for Hydrogen Production," Journal of Solar Energy Engineering, 131, 024503 (2009).

(29) Liang, X.H., D.M. King, P. Li, S.M. George, and A.W. Weimer, "Nanocoating Hybrid Polymer Films on Large Quantities of Cohesive Nanoparticles by Molecular Layer Deposition," AIChE Journal, 55 (4), 1030-1038 (2009).

(30) Liang, X.H., D.M. King, P. Li, and A.W. Weimer, "Low-temperature Atomic Layer Deposited $TiO_2$ Films with Low Photoactivity, Journal of the American Ceramic Society, 92 (3), 649-654 (2009).

(31) King, D.M., Y. Zhou, L.F. Hakim, X. Liang, P. Li, and A.W. Weimer, "In-situ Synthesis of $TiO_2$-functionalized Metal Nanoparticles," Industrial and Engineering Chemistry Research, 48, 356-360 (2009).

(32) Perkins, C. and A.W. Weimer, "Perspective - Solar-thermal Production of Renewable Hydrogen, AIChE Journal, 55(2), 286-293 (2009).

(33) Scheffe, J.R., A. Frances, D.M. King, X.H. Liang, B.A. Branch, A.S. Cavanagh, S.M. George, and A.W. Weimer, "Atomic Layer Deposition of Iron (III) Oxide on Zirconia Nanoparticles in a Fluidized Bed Reactor using Ferrocene and Oxygen," Thin Solid Films, 517, 1874-1879 (2009).

(34) King, D.M., X. Du, A.S. Cavanagh, S.M. George, and A.W. Weimer, "Quantum Confinement in Amorphous $TiO_2$ Films Studied via Atomic Layer Deposition," Nanotechnology, 19 (44), 445401 (2008).

(35) Weimer, M.A., A.W. Weimer, and W. Park, "Theory of Conduction in Metal-insulator Varistors," Journal of Applied Physics, 104, 114516 (2008).

(36) Melchior, T., C. Perkins, A.W. Weimer, and A. Steinfeld, "A Cavity-receiver Containing a Tubular Absorber for High-temperature Thermochemical Processing using Concentrated Solar Energy," International Journal of Thermal Sciences, 47, 1496-1503 (2008).

(37) King, D.M., X. Liang, P. Li, and A.W. Weimer, "Low-temperature Atomic Layer Deposition of ZnO Films on Particles in a Fluidized Bed Reactor," Thin Solid Films, 516, 8517-8523 (2008).

(38) King, D.M., X.H. Liang, B.B. Burton, M.K. Akhtar, and A.W. Weimer, "Passivation of Pigment-grade $TiO_2$ Particles by Nanothick Atomic Layer Deposited $SiO_2$ Films," Nanotechnology, 19 (25), 255604 (2008).

(39) Liang, X.H., D.M. King, M.D. Groner, J.H. Blackson, J.D. Harris, S.M. George, and A.W. Weimer, "Barrier Properties of Polymer/Alumina Nanocomposite Membranes Fabricated by Atomic Layer Deposition, "Journal of Membrane Science, 322(1), 105-112 (2008).

(40) Wilson, C.A., J.A. McCormick, A.S. Cavanagh, D.N. Goldstein, A.W. Weimer, and S.M. George, "Tungsten Atomic Layer Deposition on Polymers, Thin Solid Films, 516, 6175-6185 (2008).

(41) Shiju, N.R., X. Liang, A.W. Weimer, C. Liang, S. Dai, S.H. Overbury, and V. V. Guliants, "The Role of Surface Basal Planes of Layered Mixed Oxides in Selective Transformation of Lower Alkanes: Propane Ammoxidation over Surface AB Planes of Mo-V-Te-Nb-O M1 Phase, Journal of the American Chemical Society, 130 (18), 5850 (2008).

(42) Weimer, M.A., M.D. Groner, X. Liang, D.M. King, L.F. Hakim, P. Li, S.M. George, and A.W. Weimer, "Ultrafast Metal-Insulator Varistors Based on Tunable $Al_2O_3$ Tunnel Junctions, " Applied Physics Letters, 92, 164101 (2008)

(43) King, D.M., X.H. Liang, Y. Zhou, C.S. Carney, L.F. Hakim, P. Li, and A.W. Weimer, "Atomic Layer Deposition of $TiO_2$ Films on Particles in a Fluidized Bed Reactor," Powder Technology, 183, 356 - 363 (2008).

(44) C.A. Wilson, D.N. Goldstein, J.A. McCormick, A.W. Weimer, and S.M. George, "Tungsten Atomic Layer Deposition on Cobalt Nanoparticles," Journal of Vacuum Science & Technology A, 26 (3), 430-437 (2008).

(45) King, D.M., X.H. Liang, C.S. Carney, L.F. Hakim, P. Li, and A.W. Weimer, "Atomic Layer Deposition of UV-absorbing ZnO Films on $SiO_2$ and $TiO_2$ Nanoparticles Using a Fluidized Bed Reactor," Advanced Functional Materials, 18 (4), 607-615 (2008).

(46) Perkins, C., P.R. Lichty, and A.W. Weimer, "Thermal ZnO Dissociation in a Rapid Aerosol Reactor as part of a Solar Hydrogen Production Cycle," Int.J. of Hydrogen Energy, 33 (2), 499-510 (2008).

(47) Funke, H.H., H. Diaz, X. Liang, C.S. Carney, and A.W. Weimer, "Hydrogen Generation by Hydrolysis of Zinc Powder Aerosol,", Int. J. of Hydrogen Energy, 33, 1127-1134 (2008).

(48) Zhan, G.-D., X. Du, D.M. King, L.F. Hakim, J.A. McCormick, and A.W. Weimer, "Atomic Layer Deposition of Bulk Quantities of Surfactant – modified Single-walled Carbon Nanotubes," Journal of the American Ceramic Society, 91 (3), 831-835 (2008).

(49) Liang, X.H., G.D. Zhan, D.M. King, J. Zhang, S.M. George, and A.W. Weimer, "Alumina Atomic Layer Deposition Nanocoatings on Primary Diamond Particles Using a Fluidized Bed Reactor," Diamond & Related Materials, 17 (2), 185-189 (2008).

(50) Liang, X.H., S.M. George, A.W. Weimer, N.H. Li, J.H. Blackson, J.D. Harris, and P. Li, "Synthesis of Novel Porous Polymer/Ceramic Composite Materials by Low-Temperature Atomic Layer Deposition," Chemistry of Materials, 19, 5388-5394 (2007).

(51) Perkins, C. and A.W. Weimer, "Computational Fluid Dynamics Simulation of a Tubular Aerosol Reactor for Solar-thermal ZnO Decomposition," Journal of Solar Energy Engineering, 129, 391-404 (2007).

(52) Hakim, L.F., C.L. Vaughn, H.J. Dunsheath, C.S. Carney, X.H. Liang, and A.W. Weimer, "Synthesis of Oxidation-resistant Metal Nanoparticles via Atomic Layer Deposition," Nanotechnology, 18, 345603 (2007).

(53) Hakim, L.F., J.H. Blackson, and A.W. Weimer, "Controlling the Interparticle Forces of Nanoparticles Using Atomic Layer Deposition," Chemical Engineering Science, 62, 6199-6211 (2007).

(54) Perkins, C., P.R. Lichty, and A.W. Weimer, "Determination of Aerosol Kinetics of Thermal ZnO Dissociation by Thermogravimetry," Chemical Engineering Science 62, 5952-962 (2007).

(55) Hakim, L.F., D.M. King, Y. Zhou, C.J. Gump, S.M. George, and A.W. Weimer, "Nanoparticle Coating for Advanced Optical, Mechanical and Rheological Properties," Advanced Functional Materials, 17, 3175-3181 (2007).

(56) Wyss, J., J. Martinek, M. Kerins, J.K. Dahl, A. Weimer, A. Lewandowski, and C. Bingham, "Rapid Solar-thermal Decarbonization of Methane in a Fluid-wall Aerosol Reactor: Fundamentals and Application," International Journal of Chemical Reactor Engineering, 5, Article A69 (2007).

(57) King, D.M., J.A. Spencer II, X.H. Liang, L.F. Hakim, and A.W. Weimer, "Atomic Layer Deposition on Particles Using a Fluidized Bed Reactor with In-situ Mass Spectrometry, Surface & Coatings Technology 201, 9163-9171 (2007).

(58) McCormick, J.A., K.P. Rice, D.F. Paul, A.W. Weimer, and S.M. George, "Analysis of $Al_2O_3$ Atomic Layer Deposition on $ZrO_2$ Nano particles in a Rotary Reactor,"Chemical Vapor Deposition, 13 (9), 491-498 (2007).

(59) Perkins, C., P.R. Lichty, C. Bingham, and A.W. Weimer, "Effectiveness of a Fluid-wall for Preventing Oxidation in Solar-thermal Dissociation of ZnO," AIChE Journal, 53 (7), 1830 (2007).

(60) McCormick, J.A., B.L. Cloutier, A.W. Weimer, and S.M. George, "Rotary Reactor for Atomic Layer Deposition on Large Quantities of Nanoparticles," J. Vacuum Science and Technology A, 25 (1), 67-74 (2007).

(61) Liang, X., J.A. Spencer, L.F. Hakim, J.A. McCormick, S.M. George, K.J. Buechler, J. Blackson, C.J. Wood, J.R. Dorgan, and A.W. Weimer, "Novel Processing to Produce Polymer/ceramic Nanocomposites by Atomic Layer Deposition," Journal of the American Ceramic Society, 90 (1), 57-63 (2007).

(62) Spencer, J.A. II, X.H. Liang, D.M. King, S.M. George, A.W. Weimer, K.J. Buechler, C.J. Wood, and J.R. Dorgan, "Fluidized Bed Particle ALD Process for Producing HDPE/Alumina Nanocomposites", in Fluidization XII – New Horizons in Fluidization Engineering, Engineering Conferences International (ECI) (Brooklyn, NY)(Edited by Xiaotao Bi, Franco Berruti, and Todd Pugsley), 417-424 (2007).

(63) Francis, T.M., C.J. Gump, and A.W. Weimer, "Spinning Wheel Powder Feeding Device – Fundamentals and Applications," Powder Technology, 170, 36-44 (2006).

(64) Hakim, L.F., J.A. McCormick, G.-D. Zhan, P. Li, S.M. George, and A.W. Weimer, "Surface Modification of Titania Nanoparticles Using Ultrathin Ceramic Films," Journal of the American Ceramic Society 89 (10), 3070-3075 (2006).

(65) Walsh, J.K., A.W. Weimer, and C.M. Hrenya, "Thermophoretic Deposition of Aerosol Particles in Laminar Tube Flow with Mixed Convection," Aerosol Science, 37, 715-734 (2006).

(66) Walsh, J.K., A.W. Weimer, and C.M. Hrenya, "An Experimental Study of Thermophoretic Deposition of Aerosol Particles in Laminar Tube Flow with Mixed Convection," Aerosol Science and Technology, 40 (3), 178-188 (2006).

(67) Carney, C., C. Gump, and A.W. Weimer, "Rapid Nickel Oxalate Thermal Decomposition for Producing Fine Porous Nickel Metal Powders, Part I – Synthesis "Materials Science and Engineering A, 431, 1-12 (2006).

(68) Carney, C., C. Gump, C.M. Hrenya, and A.W. Weimer, "Rapid Nickel Oxalate Thermal Decomposition for Producing Fine Porous Nickel Metal Powders, Part II - Global Kinetics," Materials Science and Engineering A, 431, 13-125 (2006).

(69) Carney, C., C. Gump, and A.W. Weimer, "Rapid Nickel Oxalate Thermal Decomposition for Producing Fine Porous Nickel Metal Powders, Part III - Mechanism," Materials Science and Engineering A, 431, 26-40 (2006).

(70) Hakim, L.F., S.M. George, and A.W. Weimer, "Nanocoating Individual Silica Nanoparticles by Atomic Layer Deposition in a Fluidized Bed Reactor," Chemical Vapor Deposition, 11,420-425 (2005).

(71) Hakim, L.F., S.M. George, and A.W. Weimer, "Conformal Nanocoating of Zirconia Nanoparticles by ALD in a Fluidized Bed Reactor," Nanotechnology, 16, S375-385 (2005).

(72) Hakim, L.F., J.L. Portman, M.D. Casper, and A.W. Weimer, "Aggregation Behavior of Nanoparticles in Fluidized Beds," Powder Technology, 160 (3), 149-160 (2005).

(73) Ferguson, J.D., A.W. Weimer, and S.M. George, "Surface Chemistry and Infrared Absorbance Changes during ZnO Atomic Layer Deposition on $ZrO_2$ and $BaTiO_3$ Particles," Journal of Vacuum Science and Technology, 23 (1), 118-125 (2005).

(74) Ferguson, J.D., K.J. Buechler, A.W. Weimer, and S.M. George, "$SnO_2$ Atomic Layer Deposition of $ZrO_2$ and Al Nanoparticles: Pathway to Enhanced Thermite Materials," Powder Technology 156, 154-163 (2005).

(75) Dahl, J.K., A.W. Weimer, A. Z'Graggen, and A. Steinfeld, "Two-dimensional Axi-symmetric Model of a Solar-thermal Fluid-wall Aerosol Flow Reactor," Journal of Solar Energy Engineering, 127, 76-85 (2005).

(76) Ferguson, J.D.,A.W. Weimer, and S.M. George, "Atomic Layer Deposition of $Al_2O_3$ Films on Polyethylene Particles," Chemistry of Materials, 16 (26), 5602-5609 (2004).

(77) Perkins, C. and A.W. Weimer, "Likely Near Term Solar-thermal Water Splitting Technologies," International Journal of Hydrogen Energy, 29 (15), 1587-1599 (2004).

(78) Ferguson, J.D., E.R. Smith, A.W. Weimer, and S.M. George, "Atomic Layer Deposition of $SiO_2$ at Room Temperature using TEOS and $H_2O$ with $NH_3$ as the Catalyst," J.Electrochemical Society, 151 (8), G528-G535 (2004).

(79) Dahl, J.K., A.W. Weimer, A. Lewandowski, C. Bingham, F. Bruetsch, and A. Steinfeld,"Dry Reforming of Methane Using a Solar-thermal Aerosol Flow Reactor,"Industrial and Engineering Chemistry Research, 43 (18), 5489-5494 (2004).

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(81) Wank, J.R., George, S.M., and A.W. Weimer, "Nanocoating Individual Cohesive Boron Nitride Particles in a Fluidized Bed by ALD," Powder Technology, 142 (1), 59-69 (2004).

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**ALAN W. WEIMER (Inventor)**
**(UNITED STATES PATENTS)**
**Issued/Pending US Patents**

[1] "Dental Composite Filler Particles," U.S. Patent 7,396,862 (2008)

[2] "Nanomaterials for Quantum Tunneling Varistors," U.S. Patent 7,132,697 (2006)

[3] "Solar-thermal Fluid-wall Reaction Processing," U.S. Patent 7,033,570 (2006).

[4] "Nanocoated Primary Particles and Method for Their Manufacture," U.S.Patent 6,913,827 (2005)

[5] "Solar Thermal Aerosol Flow Reaction Process," U.S. Patent 6,872,378 (2005).

[6] "Insulating and Functionalizing Fine Metal–containing Particles with Conformal Ultra-thin Films," U.S. Patent 6,713,177 (2004).

[7] "Rapid Conversion of Metal-containing Compounds to Form Metals or Metal Alloys," U.S. Patent 6,689,191 (2004).

[8] "Atomic Layer Controlled Deposition on Particle Surfaces," U.S. Patent 6,613,383 (2003).

[9] "Low Temperature Oxidation Using Supported Molten Salt Catalysts," U.S. Patent 6,565,820 (2003).

[10] "Method to Produce a Transition Metal Carbide from a Partially Reduced Transition Metal Compound," U.S. Patent 6,495,115 (2002).

[11] "Method for Making Submicrometer Transition Metal Carbonitrides," U.S. Patent 5,756,410 (1998).

[12] "Silicon Nitride/Silicon Carbide Composite Densified Materials Prepared Using Composite Powders," U.S. Patent 5,643,843 (1997)

[13] "Moving Bed Process for Carbothermally Synthesizing Nonoxide Ceramic Powders," U.S. Patent 5,607,297 (1997)

[14] "Method for Producing Silicon Nitride/Silicon Carbide Composite," U.S. Patent 5,538,675 (1996)

[15] "Silicon Nitride/Silicon Carbide Composite Powders," U.S. Patent 5,525,556 (1996)

[16] "Carbothermal Synthesis Precursors," U.S. Patent 5,384,291 (1995).

[17] "Method for Making Submicrometer Carbides, Submicrometer Solid Solution Carbides, and the Materials Resulting Therefrom," U.S. Patent 5,380,688 (1995).

[18] "Moving Bed Reactor Process," U.S. Patent 5,370,854 (1994).

[19] "Process for Preparing Silicon Carbide," U.S. Patent 5,340,417 (1994).

[20] "Process for Preparing Ultrafine Aluminum Nitride Powder," U.S. Patent 5,219,804 (1993).

[21] "Method for Producing Uniform, Fine Boron-Containing Ceramic Powders," U.S. Patent 5,194,234 (1993).

[22] "High Yield Manufacturing Process for Silicon Carbide," U.S. Patent 5,190,737 (1993).

[23] "Process for Preparing Aluminum Nitride Powder via Controlled Combustion Nitridation," U.S. Patent 5,126,121 (1992).

[24] "Apparatus for Producing Uniform, Fine Ceramic Powders," U.S. Patent 5,110,565 (1992).

**Pending US Patents**

[1] "Metal Oxide Based Process for the Generation of Hydrogen from Water Splitting Utilizing a High Temperature Solar Aerosol Flow Reactor," U.S. Provisional Patent filed November 17, 2004 (published as US Application 20060188433 (August 24, 2006).

[2] "Method of Depositing of an Inorganic Film on an Organic Polymer," US Patent Application 20040194691 (published October 7, 2004); WO 03/008110 A1 (filed January 30, 2003); Provisional U.S. Patent filed July 18, 2001/Priority USP 306521; Application No.Patent No. 02748191.0-2113-US0222742

[3] "Rapid Solar-thermal Conversion of Biomass to Syngas," PCT International Patent Application PCT/US07/77134 (August 29, 2007); published as US Application 20080086946 (April 17, 2008)

[4] "Methods for Producing Coated Phosphor and Host Materials Particles Using Atomic Layer Deposition Methods," US Application 11/473,289 (June 22, 2006); published at US Application 20070298250 (December 27, 2007)

[5] "Coated Particles and Sunscreen and Cosmetic Products Containing Same," US Application 11/801,124 (May 8, 2007); published as US Application 20070280895 (December 6, 2007)

[6] "Methods for Producing Nano-scale and Submicron Sized Metal Particles with an Inorganic Coating," Provisional US Patent Application US/60/855,301 (October 30, 2006)

[7] "Atomic Layer Deposition of Iron oxide, Cobalt oxide, a Mixture of both and their Applications to Catalysis, Hydrogen Production, and the Production of Fabricated Parts," Provisional Patent Application Filed November 7, 2007

[8] "Titanium Dioxide Particles with Passivating Coating Formed by an Atomic Layer Deposition Process," U.S. Patent Application 61/034,504 (2008).

**Alan W. Weimer**
**(Honors & Awards)**

2011 Excellence in Bio-Derived Technology Commercialization Award (Colorado Cleantech Industry Assoc.)
2010 AIChE Excellence in Process Development Research Award
2010 Dean's Award for Outstanding Research (College of Engineering and Applied Science)
2010 University of Colorado Physical Sciences Company of the Year Award (Sundrop Fuels)
2009 AIChE Thomas Baron Award in Fluid-Particle Systems
2008 Plenary Address (delivered at Solar PACES Biennial 2008 conference, March, 7, Las Vegas, NV)
2007 Plenary Address (delivered at CHEMECA 2007, September, 25, Melbourne, Australia)
2007 Keynote Address (delivered at CHEMECA 2007, September, 24, Melbourne, Australia)
2007 Invited Keynote Presentation (delivered at EuroCVD16, The Hague, Netherlands, September 18, 2007)
2007 University of Colorado Physical Sciences Company of the Year Award (ALD NanoSolutions, Inc.)
2006 University of Colorado Distinguished Engineering Alumni (DEA) Award
2006 Inducted into University of Colorado at Boulder "Pinnacles of Inventorship" Group
2006 Frost & Sullivan Excellence in Technology Award (ALD NanoSolutions, Inc.)
2005 Best Paper Award (U.S. Best Zone Paper, ASEE)
2005 Keynote Address (Chemical Reactor Engineering X, Zacatecas, Mexico)
2005 University of Colorado College of Engineering and Applied Science Faculty Research Award
2005 University of Colorado Boulder Faculty Assembly Research, Scholarly and Creative Work Award
2005 United States Department of Energy Hydrogen Program R&D Award
2004 University of Colorado at Boulder Inventor of the Year Award
2004 R&D 100 Award
2004 Best Paper Award (U.S.Western Region, ASEE)
2004 Best Paper Award (Solar 2004 National Conference, Portland)
2004 Best Paper Award (Rocky Mountain ASEE Meeting)
2004 Fellow of the AIChE
2004 Keynote Address (PARTEC2004, Nuremberg, Germany)
2002 Best Paper Award (11$^{th}$ International Solar PACES, Zurich)
2002 Outstanding AIChE National Student Chapter Award (Advisor)
2002 University of Colorado Faculty Fellowship
2002 Left Hand Laurel Community Service Award (Niwot, CO)
2000 & 2001 Faculty Mentor Award (awarded by graduating seniors)
2001 Special Teaching Recognition Award (awarded by graduating seniors)
1997 AIChE Particle Technology Forum *Fluidized Process Recognition* Award
1996 Mid-Michigan AIChE *Distinguished Service Award*
1995 Dow Chemical Company *Excellence in Science* Award
1994 Dow Chemical Company *Ceramics Technology Leadership* Special Recognition Award
1993 Dow Chemical Company Research *Inventor of the Year* Award
1993 Dow Chemical Company *Ceramics Milestone* Award
1993 Mid-Michigan AIChE *Professional Progress* Award
1992 Mid-Michigan Sigma Xi "*Best Published Scientific Paper of the Year* Award"
1991 *Distinguished Young Engineering Alumnus* (University of Cincinnati)
1990 Dow Chemical Company *Spangenberg Ceramics Founder's Award*
1989 Dow Chemical Company *Ceramics Milestone* Award
1976 Herman Schneider Medal (University of Cincinnati College of Engineering)

**Alan W. Weimer**
**(Invited Presentations)**

"Overview of Solar Fuels Technology", invited presented at Global Clean Energy Congress & Exhibition, Calgary, Albert, Canada (October 31, 2011).

"Nanofilms for Solarthermochemical Redox", invited presentation at Nano-Renewable Energy Summit, Golden, CO (October 25, 2011).

"Rapid Solar-thermal Conversion of Biomass to Syngas", invited presented at American Chemical Society National Meeting, Denver, CO (August 29, 2011).

"Functionalization of Fine Particles by Atomic/Molecular Layer Deposition (ALD/MLD) ", invited presentation at Tyco Electronics, Menlo Park, CA (July 14, 2011).

"Rapid Solar-thermal Conversion of Biomass to Syngas", invited presentation at Danforth Plant Science Center, St. Louis, MO (April 13, 2011).

"Rapid Solar-thermal Conversion of Biomass to Syngas", invited presentation at Phycal, St. Louis, MO (April 13, 2011).

"The Role of High-temperature Solar in Low Carbon Hydrogen", invited presentation at Toyota Sustainable Mobility Seminar, La Jolla, CA (April 5, 2011).

"Intellectual Property and Entrepreneurial Opportunities Resulting from Basic Science Research - Creating Real Jobs", invited presentation at Executive Night Speaker Series, Regis University, March 24 (2011).

"Renewable Solar-thermal Production of Fuels from Biomass and Water", invited presentation at Transformational Energy Seminar Series, University of Maryland, College Park, MD (February 26, 2011).

"Thin Film Ferrites by ALD for Solar Redox Cycles", invited presentation at Sun to Petrol Conference, Sandia National Laboratory, Albuquerque, NM (February 23, 2011).

"Renewable Solar-thermal Production of Fuels from Biomass and Water", invited presentation at Ball Aerospace, Boulder, CO (February 11, 2011).

"Functionalization of Ultrafine Particles with Nanothick Controlled Films," invited presentation at the 35$^{th}$ International Conference on Advanced Ceramics and Composites (ICACC) Meeting, Daytona Beach, FL (January 27, 2011).

"Commercial Success Through Fundamental Understanding, Persistence and Cost/Performance Benefits," presented at the 2010 International Conference on Energy, Energy Logistics and the Environment, invited presentation, October 8, 2010 (Denver, CO).

"Functionalization of Ultra-fine Particles with Nano-thick Controlled Films," NSTI Nanotech 2010, invited Keynote Address, June 22, 2010 (Anaheim, CA).

"Metal Ferrite Spinels for Solar-thermal Water Splitting Redox Cycles," invited Keynote Address presentation TMS 2010 Annual Meeting, February 17, 2010 (Seattle, WA).

"Solar-thermal Process Intensification," invited presented at Sandia National Laboratory, February 11, 2010 (Livermore, CA)

"Functionalization of Fine Particles by Atomic/Molecular Layer Deposition (ALD/MLD)," invited presented at Lawrence Livermore National Laboratory, February 10, 2010 (Livermore, CA)

"Functionalization of Fine Particles by Atomic/Molecular Layer Deposition (ALD/MLD)," presented at Lehigh University Graduate Seminar, January 20, 2010 (Bethlehem, PA)

"Functionalization of Fine Particles by Atomic/Molecular Layer Deposition (ALD/MLD) ," invited presentation to be made at the 2009 Annual Meeting of the American Institute of Chemical Engineers, Particle Technology Forum – Awards Lecture, November 11, 2009 (Nashville, TN)

"Particle ALD – Academic Invention to Commercial Development ," invited presentation at the 2009 Annual Meeting of the American Institute of Chemical Engineers, Chemical Engineering Principles for Nanotechnology - Plenary Session, November 11, 2009 (Nashville, TN)

"Particle ALD/MLD Functionalization of Fine Particles," invited presentation at the 216$^{th}$ Meeting of the Electrochemical Society, October 6, 2009 (Vienna, Austria)

"Solar-thermal Production of Renewable Fuels," presented at ETH Zurich (Swiss Federal Research Institute), Zurich, Switzerland (May 24, 2009).

"The Future of Biofuels and Chemical Engineering Opportunities," presented at the 10$^{th}$ International Chemical Engineering Student Conference, Monterrey, Mexico (February 19, 2009).

"Solar-thermal Production of Renewable Fuels from Water and Biomass," presented at Oregon State University Graduate Seminar, Corvallis, OR (January 26, 2009).

"The Future of Biofuels," presented at the 2008 International Food Service Distribution Conference, Pittsburgh, PA (October 13, 2008).

"Solar-thermal Production of Renewable Fuels from Water and Biomass," presented at University of Minnesota Graduate Seminar, University of Minnesota, Minneapolis, MN (October 1, 2008).

"Solar-thermal Production of Renewable Fuels from Water and Biomass," presented at University of Michigan Graduate Seminar, University of Michigan, Ann Arbor, MI (September 23, 2008).

"Renewable Biofuels Using Rapid Solar-thermal Processing," Featured presentation at the Second Generation Biofuels (Innovation in BioFuels 2008) Conference, Baltimore, MD (May 14, 2008).

"Functionalization of Ultrafine Particles by Atomic Layer Deposition," invited presentation made to the Ceradyne Corp. Technology Review, Cost Mesa, CA (March 13, 2008).

"Renewable Fuels via Solar-thermal Processing," Keynote Address presented at the 2008 Solar PACES Biennial Meeting, Las Vegas, NV (March 7, 2008).

"Solar-thermal Production of Renewable Fuels from Water and Biomass," presented at University of California at Santa Barbara Graduate Seminar, Santa Barbara, CA (February 7, 2008).

"Functionalization of Ultrafine Particle by Atomic Layer Deposition," presented at the Particle Technology Center Graduate Seminar, University of Florida, Gainesville, FL (January 22, 2008).

"Commercial Success through Fundamental Understanding and Persistence," Plenary Address presented at CHEMECA 2007 in Melbourne, Australia (September 25, 2007).

"Functionalization of Fine Particles using Atomic Layer Deposition," Keynote Address presented at CHEMECA 2007 in Melbourne, Australia (September 24, 2007).

"Particle Coating in Fluidized Bed Reactors", Invited Keynote Address presented at EuroCVD 16, The Hague (Netherlands), (September 17, 2007).

"Functionalization of Ultrafine Particles by Atomic Layer Deposition," presented at Procter and Gamble Corporation, Cincinnati, OH (February 27, 2007).

"Functionalization of Ultrafine Particles by Atomic Layer Deposition," presented at University of Cincinnati Graduate Seminar, Cincinnati, OH (February 27, 2007).

"Functionalization of Ultrafine Particle by Atomic Layer Deposition, "presented at Millennium Chemical Company, Baltimore, MD (April 30, 2007).

"Solar-thermal Processing to Split Water," presented at the Department of Chemical and Biological Engineering, Colorado State University, Fort Collins, CO (April 20, 2007).

"Solar-thermal Water Splitting Using a Zn/ZnO Thermochemical Cycle," 2007 Inaugural Energy symposium UNLV, Las Vegas, NV (August 16, 2007)

"Solar-thermal Splitting of Water Using a Rapid ZnO Thermochemical Cycle: Fundamentals and Experimental Results", presented at the Department of Chemical Engineering, Illinois Institute of Technology, Chicago, IL, Graduate Seminar (November 29, 2006).

"Functionalization of Ultrafine Particles Using Atomic Layer Deposition (Particle ALD$^{TM}$)", presented at the 2$^{nd}$ Engineered Particle Applications Conference, presented in Las Vegas, NV (October 19, 2006).

"Solar-thermal Water Splitting for the Production of Hydrogen", presented at the Renewables to Hydrogen Forum, National Hydrogen Association, Albuquerque, NM (October 5, 2006).

"Functionalization of Ultrafine Particles by Atomic Layer Deposition", presented at the Department of Chemical Engineering, West Virginia University, Morgantown, WV, Graduate Seminar, (September 15, 2006).

"Solar-thermal Production of Hydrogen from Water", presented at the Solar 2006 Meeting, Denver, CO (July, 13, 2006).

"Functionalization of Ultrafine Particles by ALD," A.W. Weimer, paper presented at the Int'l Fine Particle Research Institute, Santa Barbara, CA (June 26, 2006).

"Solar-thermal Processing to Produce Hydrogen from Water," presented to Xcel Energy, Boulder, CO (April 28, 2006).

"Functionalized Nanoparticles – a Tutorial," (web cast) A.W. Weimer, tutorial presented at the 5$^{th}$ World Congress on Particle Technology, Orlando, FL (April 25, 2006).

"Micron and Nanoparticle Coating Using Atomic Layer Deposition", presented at the E.V. Murphree Awards Session in Honor of L.S. Fan, American Chemical Society 231st Annual Meeting, Atlanta, GA (March 28, 2006).

"Particle ALD$^{TM}$ Technology," A.W. Weimer, paper presented at the Nanomaterials Project seminar series, Air Products and Chemicals Corp., Allentown, PA (March 7, 2006)

"Particle ALD$^{TM}$ Technology," A.W. Weimer, paper presented at Osram Sylvania Corporation, Towanda, PA (March 8, 2006).

"Solar Thermochemical Splitting of Water: Theory, Application, and Materials Research Opportunities", presented at Stanford University – Global Climate and Energy Project Seminar, Palo Alto, CA (February, 2006).

"Novel Polymer Particle ALD$^{TM}$ Extrusion Method for Producing Polymer/Ceramic Nanocomposites", presented at Lyondell Chemical Company, Cincinnati, OH (November, 2005).

"Functionalizing Ultrafine Particles by Atomic layer Deposition (ALD)", presented at the Department of Chemistry and Biochemistry, University of Denver, Denver, CO (October, 2005).

"Solar-thermal Reactors: Fundamentals and Applications," presented at the Department of Chemical Engineering, University of New Mexico, Albuquerque, NM, Graduate Seminar, (October, 2005).

"Synthesis of Boron – rich Boron Carbide Powders for Improved Ceramic Armor," presented at Ceradyne Corporation and the U.S. Army, Costa Mesa, CA (September, 2005).

"Solar-thermal Reactors: Fundamentals and Applications," Keynote Lecture, Chemical Reactor Engineering X International Conference, Zacatecas, Mexico (August, 2005).

"Solar-thermal Processing to Decarbonize Natural Gas," presented at the Department of Mechanical and Process Engineering, ETH-Zurich (Swiss Federal Research Institute), Graduate Seminar, (June, 2005).

"Functionalizing Ultrafine Particles by Atomic Layer Deposition," presented at Cabot Corporation, Albuquerque, NM, (June, 2005).

"Atomic Layer Deposition to Control Particle Surface Functionality," presented at the Department of Chemical Engineering, University of Missouri, Rolla, MO, Graduate Seminar, (September,2004).

"Solar-thermal Production of Hydrogen," presented at General Electric Global Research laboratory, Niskayuna, NY (September, 2004).

"Solar-thermal Production of Hydrogen,"presented at the Arizona Public Service Company, Phoenix, AZ (July, 2004).

"Solar Thermochemical Production of Hydrogen," invited tutorial presented at the 2004 International Solar Energy Conference, Portland, OR (July, 2004)

"Commercial Success Through Fundamental Understanding and Persistence," Keynote Lecture, International World PARTEC2004 Conference, Nuremberg, Germany (March, 2004).

"Conformal Encapsulation of Fine Particles with Ceramic Nanolayers, presented at the Department of Chemical Engineering, University of Pittsburgh, Graduate Seminar, Pittsburgh, PA (February, 2003).

"Passivating Ultrafine iron Powders by Atomic layer Deposition Surface Modification."presented at the Swiss Federal Research Institute (ETH-Zurich, Switzerland)(May, 2003).

"Solar-thermal Processing to Produce Hydrogen", presented at the Paul Scherrer Institute, Villigen, Switzerland (May, 2003).

"Fundamentals, Development, and Commercialization of the Rapid Carbothermal Reduction Process," presented at the Sandvik Tungsten Carbide Production Facilities," Coromant, United Kingdom (England) (May, 2003).

"Atomic Layer Deposition Processing to Control the Surface Chemistry of Ultrafine Powders, presented at the Swiss Federal Laboratories for Materials Testing and Research (EMPA), Thun, Switzerland (July, 2003).

"The Rapid Carbothermal Reduction Synthesis of Boron Carbide Powders," presented at the Wacker-Chemie GmbH Chemical Company, Kempten, Germany (August, 2003).

"Rapid Solar-thermal Decarbonization of Methane," presented at General Electric Global Research laboratory, Niskayuna, NY (August, 2003).

"Atomic Layer Deposition to Control Surface Chemistry of Fine Particles," presented at General Electric Global Research laboratory, Niskayuna, NY (August, 2003).

"Boron Content Modification of Boron Carbide," presented at the Army Research Laboratories, Aberdeen, MD (March, 2003).

"Solar-thermal Processing for Thermochemical Cycles to Split Water," presented at the University of Nevada at Las Vegas (UNLV), Las Vegas, NV (November, 2003).

"Solar-thermal Production of Hydrogen," presented at Arizona Public Service Company, Phoenix, AZ (November, 2003).

"Producing Boron-rich Boron Carbide Powders by Rapid Carbothermal Reduction," presented at Ceradyne, Inc., Costa mesa, CA (January, 2002).

"Conformal Encapsulation of Fine Particles with Ceramic Nanolayers," presented at NIST Magnetic Technology Division Seminar, Boulder, CO (January, 2002).

"Designing for Benign Hydrogen Synthesis in the Sunny Desert SW United States," Environmental Design Architecture Guest Lecture, Boulder, CO (February, 2002).

"Fine Nickel Powder Synthesis from Nickel Oxalate Precursors," presented at OMG Americas, Research Triangle park, NC (April, 2002).

"Solar-thermal Processing to Produce Hydrogen," presented at Chevron-Texaco, Richmond, CA (September, 2002).

"Solar-thermal Processing to Produce Hydrogen," presented at the Electric Power Research Institute (EPRI), Palo Alto, CA (September, 2002).

"Solar-thermal Processing to Produce Hydrogen," presented at General Motors Corporation, Warren, MI (October, 2002).

"ALD on Particles," presented at The Dow Chemical Company, Corporate Seminar Series, Midland, MI (October, 2002).

"Atomic Layer Deposition on Particles – Chemistry and Engineering," presented to the Department of Chemical Engineering - Graduate Seminar, University of California at Santa Barbara (October, 2002)

"Solar-thermal Processing to Produce Hydrogen," presented at BP, Houston, TX (October, 2002).

"Solar-thermal Processing to Produce Hydrogen," presented at the Arizona Public Service Company – Pinnacle West, Phoenix, AZ (November, 2002).

"Atomic layer Deposition – Chemistry and Engineering," presented to the Department of Process Engineering, Graduate Seminar, Swiss Federal Institute of Technology (ETH-Zurich, Switzerland) (December, 2002).

"Solar-thermal Dissociation of Natural Gas in an Aerosol Flow Reactor," presented at the Paul Scherer Institute, Villigen, Switzerland (December,2002).

"Commercializing Novel Particle Technologies," presented to the Department of Process Engineering, Graduate Seminar, Swiss Federal Institute of Technology (ETH-Zurich, Switzerland) (December, 2002).

"Rapid Process for the Benign Synthesis of Hydrogen," presented to the Department of Chemical Engineering - Graduate Seminar, Colorado School of Mines and Technology (November, 2001)

"Rapid Solar-thermal Dissociation of Natural Gas," presented to the Department of Chemical Engineering - Graduate Seminar, University of Maryland, (October, 2001).

"Rapid Solar-thermal Dissociation of Natural Gas," presented at BP, Anchorage, AK (October, 2001).

"Rapid Solar-thermal Dissociation of Natural Gas," presented to the Department of Chemical Engineering - Graduate Seminar, University of Colorado, (September, 2001).

"Rapid Carbothermal Reduction Processing using Aerosol Flow Reactors," presented to the Department of Materials Science and Engineering – Graduate Seminar, University of Washington (June, 2000)

"Rapid Carbothermal Reduction Processing using Aerosol Flow Reactors," presented to the Department of Chemical Engineering – Graduate Seminar, University of Arizona, Tucson, AZ (October, 1998)

Processing and Properties of NanoPhase $SiC/Si_3N_4$ Composites, invited presentation at the $5^{th}$ Annual International Conference on Composites Engineering, Las Vegas, NV (July, 1998).

"Rapid Carbothermal Reduction Processing using Aerosol Flow Reactors," presented to the Department of Chemical Engineering – Graduate Seminar, University of California at Los Angeles (UCLA) (April, 1998)

"Rapid Carbothermal Reduction Processing using Aerosol Flow Reactors," presented to the Department of Chemical Engineering – Graduate Seminar, University of New Mexico (December, 1997)

"Tutorial – Advanced Ceramic Materials Synthesis," presented at the $16^{th}$ Annual Conference of the American Association for Aerosol Research, invited Tutorial Lecture (October, 1997)

"Plenary Paper:  High Temperature Aerosol Processing to Synthesize Advanced Ceramic Powders," invited Plenary presentation at the 1996 Annual Conference of The American Association for Aerosol Research, Orlando, FL, October, 1996.

"High Temperature Formation Processes for Producing Fine Advanced Ceramic Powders – invited Tutorial," presented at the 1995 Annual AIChE Meeting, Miami Beach, FL, November 1995.

"Rapid Carbothermal Reduction Processing & Kinetics for Synthesizing Fine Silicon Carbide Powders," presented to the Department of Chemical Engineering – Graduate Seminar, University of Colorado, Boulder, CO, August, 1995.

"Rapid Carbothermal Reduction Processing & Kinetics for Synthesizing Fine Silicon Carbide Powders," presented at the University of Cincinnati, Graduate Seminar, Cincinnati, OH, June, 1995.

"Flow Reaction Processing for the Manufacture of Fine Ceramic Powders," Dow Chemical Company Excellence in Science Award Presentation, Midland, MI, March, 1995.

"Synthesis of Nitride Ceramic Powders," invited Plenary Presentation, 96th Annual American Ceramics Society Meeting, Indianapolis, IN, April, 1994.

"Non-Oxide Ceramic Powder Synthesis," mid-Michigan Inorganic Science Group 1st Quarter Tutorial Presentation, Midland, MI, March, 1994.

"Synthesis of Nitride Ceramic Powders," presented at Oregon State University, Graduate Seminar, Corvallis, OR, February, 1994.

"Synthesis and Processing of Non-Oxide Ceramics," Tutorial Lecture, 1993 Annual AIChE Meeting, St. Louis, MO, November, 1993.

"Synthesis and Processing of Non-oxide Ceramics," presented at the University of Cincinnati, Cincinnati, OH, October, 1993.

"Rapid Carbothermal Reduction of Boron Oxide in a Graphite Transport Reactor," Sigma Xi "Best Paper of the Year Award Presentation," Midland, MI, January, 1993.

"Nonoxide Powders from Solid Reactants via a Rapid Carbothermal Reduction Aerosol Process," invited lecture presented at the Engineering Foundation Vapor Phase Manufacture of Ceramics Conference, Kona, Hawaii, January, 1992.

"A Rapid Carbothermal Reduction Process for the Manufacture of Boron Carbide," presented at The Ohio State University, Columbus, OH, October, 1991.

"The Reasons to Pursue a Ph.D. in Chemical Engineering," presented to the University of Cincinnati AIChE Student Chapter, Cincinnati, OH, March 1991.

"Rapid Carbothermal Reduction of Boron Oxide in a 2000°C Graphite Transport Reactor," presented at Oregon State University, Corvallis, OR October, 1990.

"Rapid Carbothermal Reduction of Boron Oxide in a 2000°C Graphite Transport Reactor," presented at the University of Colorado, Boulder, CO, October, 1990.

"The General Phenomena of High Pressure Gas-Solid Fluidization," presented at The Ohio State University, Columbus, OH, October, 1988.

"Fundamentals and Applications of High Pressure Fluidized Beds of Fine Carbon Powders," presented at the University of Cincinnati, Cincinnati, OH, February, 1988.

"High Pressure Fluidization Studies," presented at the University of Colorado, Boulder, CO, February, 1987.

"High Pressure Fluidization Fundamentals," presented at the University of Colorado, Boulder, CO, March, 1984.

**Alan W. Weimer**
**(Service Activities)**

## Professional Activities

Founding Executive Director – Colorado Center for Biorefining and Biofuels – 2007 to present (CU, CSU, CSM, NREL, State of Colorado Collaboratory for Renewable Energy)
Associate Editor – Journal of Nanoparticle Research, 2006-present
Global Project Coordinator – International Partnership for the Hydrogen Economy (www.IPHE.net) – "Solar-driven High Temperature Thermochemical Production of Hydrogen" 2005-present
Editorial Board – Powder Technology (Elsevier) (2005-present)
Advisory Board – Journal of Nanomaterials (Hindawi) (2006-present)
Chair, AIChE Particle Technology Forum, 2004- 2006
Vice Chair, AIChE Particle Technology Forum, 2002-2004
Treasurer, AIChE Particle Technology Forum, 2000-2002
Executive Committee, AIChE Particle Technology Forum, 1999-present
Treasurer, Fifth World Congress on Particle Technology (held April, 2006 in Orlando, FL)
Planning Committee Fourth World Congress on Particle Technology (Sydney, Australia, July, 2002)
Director, AICHE Materials and Engineering Sciences Division (MESD),1997-1999
Editor, AIChE Journal Special Issue, "Ceramics Processing", 43 (11A) 1997
Chair, 1996 International Topical Ceramics Conference (San Diego, CA)
Chair, AIChE Area 8d (Ceramics), 1995-1997
Vice Chair, AIChE Area 8d (Ceramics), 1993-1995
Chair, AIChE Area 3b (Fluidization and Fluid-Particle Systems), 1990-1991
Vice Chair, AIChE Area 3b (Fluidization and Fluid-Particle Systems), 1988-1990
Director, Mid-Michigan AIChE Local Chapter, 1994-1996.
Chair, Mid-Michigan AIChE Continuing Education Committee, 1994-1996.
Chair, Mid-Michigan AIChE National Engineer's Week Outreach Activities
Reviewer for Powder Technology, Chemical Engineering Science, Journal of the American Ceramic Society, Industrial and Engineering Chemistry Research & Development, Journal of Solar Energy Engineering, Energy, Journal of Materials Science, AIChE Journal, Journal of Nanoparticle Research, Advanced Materials, Chemistry of Materials, Advanced Functional Materials, Surface and Coating Technology,
AIChE Session Chair – Annual Meeting of AIChE (1989-present, yearly)

## University Activities

ChBE Move Committee Chair – 2010-2011
RASEI (Renewable and Sustainable Energy Institute) Fellow, 2010 - 2011
ChBE Graduate Seminar Committee, 2008-present; Chair Spring, 2009
ChBE Faculty Seminar Committee, 2008-present; Chair
CU Energy and Sustainability Engineering College Initiative, 2008-present
CU Energy Initiative Leadership Team Faculty Affiliate, 2008-present
CU CRCW Awards Committee (Boulder Campus), 2007
ChBE Awards Committee, ChBE (2007 - present)
ChBE Undergraduate Program Committee (2006-present)
Chair, Council on Research and Creative Work (CRCW), Boulder Campus, 2004-2006
CU CRCW, Boulder Campus (2003-2004)
ChBE AIChE Undergraduate Student Chapter Advisor (1996-2001; 2003-2007)
ChBE ABET (Engineering Accreditation) Chairman (2000-2007)
ChBE Undergraduate Senior Advisor (2007 - present)
ChBE Undergraduate Sophomore and Materials Option Advisor 1997-2003; 2005-2006)
Chair, First Level Review Committee, ChBE (2006-present)
ChBE Faculty Search Committee, (1997-1998; 2005-present)
ChBE Shop Committee Chairman, (1997-1999)

ChBE Industrial Advisory Committee (1996-1998)
ChBE Undergraduate Seminar (1997-1998)
ChBE Safety Committee Chairman, (1997-2000)
ChBE Co-operative Education Chairman (2000-2004; co-founder of co-op program in 2000)

**Alan W. Weimer**
**(Industrial Experience)**

PROFESSIONAL LICENSING
Licensed PE - State of Colorado (# 20279)

ENTREPRENEURIAL ACTIVITIES
Copernican Energy (Boulder, CO)
Co-founded in November, 2006 (Univ. of Colorado spinoff); merged with Sundrop Fuels in July, 2008; served as CTO of Sundrop Fuels from July, 2008 until July, 2011

ALD NanoSolutions, Inc. (Broomfield, CO)
Co-founded in June, 2001 (Univ. of Colorado spinoff)

***Industrial Experience***

The Dow Chemical Company, Midland, MI (1980 - 1996)
1980-1983: Sr. Research Engineer, Organic Chemicals Research
1983-1987: Project Leader, Chemicals Research/Engineering Research & Development
1987-1991: Research Leader, Ceramics & Advanced Materials Research (C&AMR)
1991-1994: Research Associate, C&AMR
1994-1995: Technical Leader, C&AMR
1995-1996: Associate Scientist, C&AMR

***Co-Inventor of Commercial Technology***

Invention, Fundamentals, Development, and Commercialization of the "Rapid Carbothermal Reduction" Process for Producing Super-Ultrafine Ceramic Powders

***Additional Industrial (Non-Ceramics) R&D Contributions***

Developed a Low Cost Melt Polymerization Process for the Manufacture of Polycarbonate Resin
Developed a Fluidized Bed Agglomeration Process for the Manufacture of Superadsorbent Polymers
Developed a Fluidized Bed Polymeric Coating Process for the Timed Release of Agricultural Chemicals
Developed a Fixed Bed Catalytic Reactor Process for the Manufacture of Methyl Methacrylate Monomer
Developed a High Pressure Fluidized Bed Fischer Tropsch Process for the Manufacture of Mixed Alcohols
Chairman of The Dow Chemical Company Technology Status Analysis Teams for (1) the Manufacture of Hydrogen Peroxide by a Novel Membrane Process (Sarnia, Ontario) and (2) the Catalytic Extraction Process for Recovering and Recycling Compounds from Hazardous Chlorinated Wastes (Freeport, TX)
Dow Chemical Company U.S. Area Dioxin Task Force

**(Teaching Evaluations, since 2000)**

CHEN-2120 Material and Energy Balances
CHEN-4520 Chemical Process Synthesis (1st semester capstone design)
CHEN-4530 Chemical Engineering Projects (2nd semester capstone design)

Post Spring, 2007 (Ratings 0 to 6)

| Course & Term | # students | Ratings (A..W. Weimer/Dept. Average) Instructor | Course | Learning Experience |
|---|---|---|---|---|
| CHEN-4530 (Spring, 2007) | | 5.3/4.3 | 4.7/4.2 | 4.9/4.4 |
| CHEN-4520 (Fall, 2007) | | 5.0/4.5 | 4.5/4.2 | 5.1/4.5 |
| CHEN-4530 (Spring, 2008) | | 5.3/4.6 | 4.9/4.3 | 5.2/4.6 |
| CHEN-4520 (Fall, 2008) | | 4.5/4.8 | 4.2/4.4 | 4.5/4.6 |
| CHEN-4530 (Spring, 2009) | | 5.1/4.8 | 5.0/4.4 | 5.0/4.6 |
| CHEN-4520 (Fall, 2010) | | 4.9/4.8 | 4.5/4.5 | 5.1/4.7 |
| CHEN-4530 (Spring, 2011) | | 5.6/4.9 | 5.1/4.5 | 5.3/4.7 |

Prior to Spring, 2007 (Ratings 0 to 4)

| Course&Term | # Students | Ratings (A.W. Weimer/Dept. Average) Instructor | Course | Learning Experience |
|---|---|---|---|---|
| CHEN-2120 (Spring, 2006) | 35 | 2.85(B)/2.82 | 2.65(B-)/2.61 | 3.16(B)/2.88 |
| CHEN-4530 (Spring, 2006) | 45 | 2.78(B)/2.82 | 2.56(B-)/2.61 | 2.90(B)/2.88 |
| CHEN-4530 (Spring, 2005) | 45 | 2.63(B-)/2.82 | 2.76(B)/2.65 | 2.95(B)/2.91 |
| CHEN-4520(Fall, 2004) | 47 | 3.38(B+)/2.91 | 3.00(B)/2.66 | 3.46(B+)/2.95 |
| CHEN-4530(Spring, 2004) | 46 | 3.68(A)/2.95 | 3.46(B+)/2.72 | 3.71(A)/3.02 |
| CHEN-4520(Fall, 2003) | 29 | 3.79(A)/3.01 | 3.60(A-)/2.80 | 3.71(A)/3.05 |
| CHEN-4520(Spring, 2002) | 38 | 2.33(C+)/2.96 | 2.33(C+)/2.78 | 2.81(B)/3.05 |
| CHEN-2120(Fall, 2001) | 69 | 3.34(B+)/3.10 | 3.31(B+)/2.71 | 3.62(A-)/2.98 |
| CHEN-4520(Spring, 2001) | 54 | 3.44(B+)/3.20 | 3.21(B)/2.90 | 3.51(A-)/3.21 |
| CHEN-2120(Fall, 2000) | 77 | 3.56(A-)/3.16 | 3.29(B+)/2.99 | |
| CHEN-4090(Fall, 2000) | 29 | 3.57(A-)/3.16 | 3.43(B+)/2.99 | 3.32(B+)/3.20 |
| CHEN-4520(Spring, 2000) | 53 | 3.49(B+)/3.24 | 3.27(B+)/3.07 | |

# Alan W. Weimer
# (Directed Research)

**Theses Directed**

Peter Czerpek, M.S.1998
David Chacon, M.S. 1999
Patrick Hilbert, M.S. 1999
Andrew Yoder, M.S.2003
Jeffrey Wank, Ph.D. 2003
Jaimee Dahl, Ph.D., 2004
Casey Carney, Ph.D. 2005
Jennifer Walsh, Ph.D. 2005
Luis Hakim, Ph.D. 2006
Christopher Perkins, Ph.D. 2006
Chad Smith, M.S., 2008
Todd Francis, Ph.D., 2008
David King, Ph.D., 2008
Xinhua Liang, Ph.D., 2008
Jonathan Scheffe, Ph.D. expected 2010
Yun Zhou, Ph.D. expected 2011
Janna Martinek, Ph.D. expected 2011
Paul Lichty, Ph.D. expected 2011
Bryan Woodruff, Ph.D. expected 2012
Victoria Aston, Ph.D. expected 2012
Elizabeth Saade, Ph.D. expected 2012
Troy Gould, Ph.D. expected 2013
Darwin Arifin, Ph.D. expected 2014
Alia Lubers, Ph.D. expected 2014
Christopher Muhich, Ph.D. expected 2014
Aaron Palumbo, Ph.D. expected 2014
Staci van Norman, Ph.D. expected 2014

**Postdoctoral Research Associates Directed**

Dr. Karen Buechler (2001-2003)
Dr. Casey Carney (2005-2007)
Dr. Todd Francis (2009)
Dr. Hans Funke (2005-present)
Dr. Christopher Gump (2003-2005)
Dr. David King (2009-present)
Dr. Jianhua Li (2007-present)
Dr. Xinhua Liang (2009-present)
Dr. Brian Neltner (2010-present)
Dr. Christopher Perkins (2007-2008)
Dr. Guodong Zhan (2005-2006)

**Professional Research Assistants Directed**

Kathryn Barrett (2009-2010)
Melinda Channel (2008-present)
Richard “Chip” Fisher (2010-present)
Oliver Kilbury (2010)
Kimberly Zimmer (2010-present)

**Undergraduate Research Students Supervised**
**(Independent Study and Sr. Thesis)**

Kayla Weston, 2011-present
Amanda Sagastegui, Summer REU (2011); Princeton University
Jesus Jaime Leal Chapa, Summer REU (2011); Monterrey Inst. of Technol.
Kathryn Geldart, Summer REU (2011); University of Massachusetts
Kelly Anderson, 2011-present
Christopher Wilson, 2011
Anthony Alli, 2011-present
Will Schwab, 2011-present
Brittany Jo Michael, 2011-present
Chris Bohling, 2010-2011
Erica Jorgensen, 2010 –present (Sr. Thesis, 2012)
Benjamin Switzer, 2010
Lauren Blinn, Summer REU (2010); University of Florida
Brian Evanko, 2009-present (Sr. Thesis, 2011)
Amy Oberlin, Summer REU (2009); Univ. of Michigan
Clay Beavers, Summer REU (2009); New Mexico Tech
Alan Azar, Summer REU (2009; 2010); Monterrey Inst. of Technol.
Margarite Parker, 2005, 2008/2009; Sr. Thesis (2009)
Seth Parker, 2008-2009
Melissa Rickman, 2008-2009
Eran Rozewski, 2008-present
Samantha Johnson, 2007-present; Sr. Thesis (2011)
Andrew Demars, 2008
Brittany Lancaster, 2007/2008; Sr. Thesis (2008)
Benjamin Chittick, 2008
Freya Kugler, 2007/2008
Ami Patel, 2007/2008
Peter Kreider, 2007-present; Sr. Thesis (2010)
Oliver Kilbury, 2006 – 2008; Sr. Thesis (2008)
Gevorg Sargsyan, 2006 - 2007
Andrea Francis, 2007 Summer REU, Monterrey Institute of Technology
Amanda Scott, 2007 Summer REU, Vanderbilt University
Henry Diaz, 2006
Paul Lichty, 2005/2006
Margarite, Parker, 2005
Lauren Brickner, 2005/2006
Heather Dunsheath, 2005 Summer REU, Rice University
Alyssa Roessler, Boulder High School Sr. Student
Candace Vaughn, 2005 (Sr. Thesis)
Michael Kerins, 2005
Janna Martinek, 2005
Jeffrey Wyss, 2005
Michele Buzek, 2004
Michele Casper, 2004 Summer REU, Univ. Of South Carolina
Jason Mooney, 2004
Eli Paster, 2004
Candace Vaughn, 2004
Jeremy Zartman, 2004
Houston Frost, 2003
Brian Stephens-Hotopp, 2003 (Sr. Thesis)

Brandon Hughes, 2003
Leslie Morgret, 2003 (Sr. Thesis)
Julie Portman, 2003 Summer REU, Univ. Of Missouri
Joseph Spencer, 2003 (Sr. Thesis)
Michele Zeles, 2003
Houston Frost, 2002 (Sr. Thesis)
Brandon Hughes, 2002
Leslie Morgret, 2002
Joseph Spencer, 2002
Jeffrey Weisiger, 2002
Michele Zeles, 2002
Joseph Spencer, 2001
Andy Yoder, Summer REU, Michigan State University
Barr Halevi, 2000
Jacob Johnson, 2000 (Sr. Thesis)
Shane Passon, 2000
David Scott, 2000 (Sr. Thesis)
Josphe Spencer, 2000
Joseph Tamburini, 2000 (Sr. Thesis)
Stephanie Thompson, 2000
Jacob Johnson, 1999
David Scott, 1999
John Lock, 1998 (Sr. Thesis)
John Lock, 1997
Charissa Money, 1997
Brennan Peterson, 1997 (Sr. Thesis)
David Winks, 1997
Brennan Peterson, 1996
Hyun Lee, 1996