Dr. Nick Glumac

EDUCATION

Ph.D., Mechanical Engineering (Minor in Chemistry), California Institute of Technology. June 1994

M.S., Aeronautics, California Institute of Technology. June 1990.

B.S., Mechanical and Environmental Engineering, University of California at Santa Barbara. June 1989.

EMPLOYMENT HISTORY

Professor, University of Illinois, Urbana-Champaign, Mechanical Science and Engineering, since August 2007.

Associate Professor, University of Illinois, Urbana-Champaign, Department of Mechanical and Industrial Engineering, July 2000 – August 2007.

Associate Professor, Rutgers University, Department of Mechanical and Aerospace Engineering, April 1999 – June 2000.

Assistant Professor, Rutgers University, Department of Mechanical and Aerospace Engineering, September 1994 – April 1999.

RESEARCH AREAS

Diagnostics in Reacting Flows

Laser-induced fluorescence, Raman spectroscopy, emission and absorption spectroscopy, resonance ionization, high speed pyrometry and photometry. Flows include: fuel-rich flames for hydrogen synthesis, materials synthesis environments, solid rocket motor flows.

Energetic Materials

Study of the kinetics of combustion of fine and ultrafine aluminum, aluminum hydride, and boron particles in the heterogeneous shock tube using high resolution spectroscopy. Study of the kinetics of decomposition of nanothermite materials.

Hypersonic Reacting Jets

Investigation of reacting jets of aluminum and other materials evolving from the collapse of a shaped charge liner and reacting in an underwater environment. High speed imaging and spectroscopy are used.

Synthesis of Novel Materials

Oxide nanopowder synthesis in combustion environments, diamond/carbon nanotube composite materials deposited by chemical vapor deposition, chemical vapor deposition of nanoscale titania photocatalyst films.

PUBLICATIONS//PATENTS

Journal Publications: 68 Book Chapters: 4 Patents: 1

PEER REVIEWED JOURNAL PUBLICATIONS

(1) Glumac, N. G. and D. G. Goodwin, "Diamond Synthesis in a Low-Pressure Flat Flame," *Thin Solid Films*, 212, 122-126, 1992.

(2) Glumac, N. G. and D. G. Goodwin, "Diamond Growth in a Novel Low Pressure Flame," *Applied Physics Letters*, 60, 2695-2696, 1992.

(3) Glumac, N. G. and D. G. Goodwin, "Large-Area Diamond Film Growth in a Low-Pressure Flame," *Materials Letters*, 18, 119-122, 1993.

(4) Glumac, N. G., E. J. Corat, and D. G. Goodwin, "Diamond Growth by Methane Injection into Hydrogen-Oxygen Flames," *Diamond and Related Materials*, 2, 169-173, 1993.

(5) Glumac, N. G. and D. G. Goodwin, "Diagnostics and Modeling of Strained Fuel-Rich Acetylene/Oxygen Flames used for Diamond Deposition, *Combustion and Flame*, 105, 321-331, 1996.

(6) Goodwin, D. G., N. G. Glumac, and H. S. Shin, "Diamond Film Deposition in Low Pressures Flames," *Proceedings of the Combustion Institute*, 26, 1679-1687, 1996.

(7) Chen, Y., N. Glumac, B. H. Kear, and G. Skandan, "High Rate Synthesis of Nanophase Materials," *NanoStructured Materials*, 9, 101-104, 1997.

(8) Elliott, G. S., N. Glumac, C. D. Carter, and A. S. Nejad, "Two-Dimensional Temperature Field Measurements Using a Molecular Filter Based Technique," *Combustion Science and Technology*, 125, 351-369, 1997.

(9) Glumac, N. G., "Flame Temperature Predictions and Comparison with Experiment in High Flow Rate, Fuel-Rich Acetylene/Oxygen Flames," *Combustion Science and Technology*, 122, 383-398, 1997.

(10) Glumac, N. G., Y-J. Chen, G. Skandan, and B. Kear, "Scalable High-rate Production of Non-agglomerated Nanopowders in Low Pressure Flames," *Materials Letters*, 34, 148-153, 1998.

(11) Sandrowitz, A. K. M., J. Cooke, and N. G. Glumac, "Flame Emission Spectroscopy for Equivalence Ratio Monitoring," *Applied Spectroscopy*, 52, 658-662, 1998.

(12) Skandan, G., N. Glumac, Y-J. Chen, F. Cosandey, E. Heims, and B. Kear, "Low-Pressure Flame Deposition of Nanostructured Oxide Films," *Journal of the American Ceramic Society*, 81, 2753-2756, 1998.

(13) Lehman, R. L., J. S. Gentry, N. G. Glumac, "Thermal Stability of Potassium Carbonate Near Its Melting Point," *Thermochimica Acta*, 316, 1-9, 1998.

(14) Glumac, N. G., Y-J. Chen, and G. Skandan, "Diagnostics and Modeling of Nanopowder Synthesis in Low Pressure Flames," *Journal of Materials Research*, 13, 2572-2579, 1998.

(15) Glumac, N. and J. Sivo, "Building a Fiber-Optic Spectrograph," *Sky and Telescope*, 97, 134-139, 1999.

(16) Singhal, A., G. Skandan, A. Wang, N. Glumac, B. Kear, and R. D. Hunt, "On Nanoparticle Aggregation During Vapor Phase Synthesis," *NanoStructured Materials*, 11:4, 545-552, 1999.

(17) Glumac, N. G., G. Skandan, Y. J. Chen, and B. H. Kear, "Particle Size Control During Flat Flame Synthesis of Nanophase Oxide Powders," *NanoStructured Materials*, 12, 253-258, 1999.

(18) Skandan, G., Y-J. Chen, N. Glumac, and B. H. Kear, "Synthesis of Oxide Nanoparticles in Low Pressure Flames," *NanoStructured Materials*, 11:2, 149-158, 1999.

(19) Tompa, G. S., G. Skandan, N. Glumac, and B. Kear, "A New Flame Process for Producing Nanopowders," *Ceramic Bulletin*, 78, 70-75, 1999.

(20) Colibaba-Evulet, A., A. Singhal, and N. Glumac, "Detection of AlO and TiO by Laser-Induced Fluorescence in Powder Synthesis Flames," *Combustion Science and Technology*, 157, 129-139, 2000.

(21) Khadiya, N. and N. G. Glumac, "Validation of Surface Chemistry Models Using Low Pressure Stagnation-Point Flames: Measurements of OH Above Platinum Surfaces," *Combustion Science and Technology*, 159, 147-167, 2000.

(22) Chiu, W. K. S., Y. Jaluria, and N. G. Glumac, "Numerical Simulation of Chemical Vapor Deposition Processes Under Variable and Constant Property Approximations," *Journal of Numerical Heat Transfer, Part A: Applications*, 37, 113-132, 2000.

(23) Glumac, N. G., A. Colibaba-Evulet, B. H. Kear, and G. Skandan, "Nanopowder and Nanostructured Film Synthesis in Low Pressure Flames," *Journal of Metastable and Nanocrystalline Materials*, 8, 468-475, 2000.

(24) Khadiya, N. and N. G. Glumac, "Catalytic Removal of NO from Post-flame Gases in Low Pressure Stagnation-point Flames over Platinum," *Combustion and Flame*, 125, 931-941, 2001.

(25) Glumac, N. G., "Formation and Consumption of SiO in Powder Synthesis Flames," *Combustion and Flame*, 125, 702-711, 2001.

(26) Khadiya, N. and N. G. Glumac, "Destruction of NO during Catalytic Combustion on Platinum and Palladium," *Combustion Science and Technology*, 165, 249-266, 2001.

(27) Elliott, G. S., N. Glumac, and C. D. Carter, "Molecular Filtered Rayleigh Scattering Applied to Combustion," *Measurement Science and Technology*, 12, 452-466, 2001.

(28) Singhal, A., G. Skandan, N. Glumac, and B. H. Kear, "Minimizing Aggregation Effects in Flame Synthesized Nanoparticles," *Scripta Materialia*, 44:8-9, 2203-2207, 2001.

(29) Colibaba-Evulet, A., V. Shukla, N. G. Glumac, B. Kear, and F. Cosandey, "Parametric Study of Zirconia Nanoparticle Synthesis in Low Pressure Flames," *Scripta Materialia*, 44:8-9, 2259-2262, 2001.

(30) Glumac, N. G., J. Servaites, and H. Krier, "A1O Vibrational Temperature Measurements from Burning Aluminum Particles at Elevated Pressure," *Combustion Science and Technology*, 172, 97-107, 2001.

(31) Wilson, K., S. Chiu, Y. Jalurian, and N. G. Glumac, "Control of Thin Film Growth in Chemical Vapor Deposition Manufacturing Systems: A Feasibility Study," *Journal of Manufacturing Science and Engineering*, 124, 715-724, 2002.

(32) Hu, T. and N. G. Glumac, "The Effects of Temperature Jump on CVD Modeling," *Chemical Vapor Deposition*, 8:5, 205-212, 2002.

(33) Roy, S., W. D. Kulatilaka, R. P. Lucht, N. G. Glumac, and T. Hu, "Temperature Profile Measurements in the Near-Substrate Region of Low-Pressure Diamond-Forming Flames" *Combustion and Flame*, 130, 261-276, 2002.

(34) Ogot, M., G. Elliott, and N. G. Glumac, "An Assessment of In-Person and Remotely Operated Laboratories," *Journal of Engineering Education*, 92:15, 10-15, 2003.

(35) Bailey, S. and N. G. Glumac, "Laser-Induced-Fluorescence Detection of SnO in Low-Pressure Particle-Synthesis Flames," *Applied Physics B*, 77, 455-461, 2003.

(36) Bazyn, T., R. Eyer, H. Krier, and N. Glumac, "Combustion Characteristics of Aluminum Hydride at Elevated Pressure and Temperature," *Journal of Propulsion and Power*, 20:3, 427-431, 2004.

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(41) Prakash, S., N. G. Glumac, N. Shankar, and M. A. Shannon, "OH Concentration Profiles over Alumina, Quartz, and Platinum Surfaces using Laser Induced Fluorescence Spectroscopy in Low-Pressure Hydrogen/Oxygen Flames," *Combustion Science and Technology,* 177:4, 793-817, 2005.

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(43) Glumac, N., H. Krier, T. Bazyn, and R. Eyer, "Temperature Measurements of Aluminum Particles Burning in Carbon Dioxide," *Combustion Science and Technology*, 177, 485-497, 2005.

(44) Lemke, B., C. Roodhouse, N. Glumac, and H. Krier, "Hydrogen Synthesis via Combustion of Fuel-Rich Natural Gas/Air Mixtures at Elevated Pressure," *International Journal of Hydrogen Energy*, 30:8, 893-902, July 2005.

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(48) Shankar, N., M-F. Yu, S. P. Vanka, and N. Glumac, "Synthesis of Tungsten Oxide (WO3) Nanorods using Carbon Nanotubes as Templates by Hot Filament Chemical Vapor Deposition, " Materials Letters, 60:6, 771-774, 2006.

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(52) Glumac, N. and G. Elliott, "The Effect of Ambient Pressure on Laser-Induced Plasmas in Air," Lasers and Optics in Engineering, 45, 27-35 (2007).

(53) Bazyn, T., H. Krier, N. Glumac, X. Wang, and T. L. Jackson, "Decomposition of Aluminum Hydride under Solid Rocket Motor Conditions," Journal of Propulsion and Power, 232, 457-476 (2007).

(54) Shankar, N., Glumac, N. G., Yu, M-F, and Vanka, S. P., "Growth of Nanodiamond/Carbon-Nanotubes Composites Using Hot Filament Chemical Vapor Deposition," Diamond and Related Materials 17, 79 (2008).

(55) Lynch P, Krier H, Glumac N, "A correlation for burn time of aluminum particles in the transition regime," Proceedings of the Combustion Institute, 32, 1889 (2009)

(56) Lazar E, Elliott G, Glumac N, "Control of the Shear Layer Above a Supersonic Cavity Using Energy Deposition," AIAA Journal, 46, 2987 (2008)
(57) Peuker, JMP, Lynch P., Krier, H., and Glumac, N., "Optical Depth Measurements of Fireballs from Aluminized High Explosives,"Optics and Lasers in Engineering, 47, 1009 (2009).
(58) Bill, R., Felts, J., Fant, B., Krier, H., Glumac, N., Brown, R.E., and Sinibaldi, J., "An Experimental Study of the Reaction of Aluminum and Water in Underwater Shaped Charges, JANNAF Journal of Propellants and Energetics, (in press).
(59) Glumac, N. "Absorption Spectroscopy Measurements in Optically Dense Explosive Fireballs Using a Modeless Broadband Dye Laser," Applied Spectroscopy, 63:9, 1075-1080, 2009.
(60) Xu, H., Glumac, N.G., and Suslick, K.S., "Temperature Inhomogeneity during Multibubble Sonoluminescence," Angewandte Chemie, 48, 1-5, 2
(61) Lynch, P.T., Fiore, G., Krier, H., and Glumac, N.G., "Gas-phase reaction in nano-aluminum combustion," Combustion Science and Technology, (in press).
(62) Lynch, P.T., Krier, H., and Glumac, N.G., "Emissivity of Aluminum Oxide Particle Clouds: Application to Pyrometry of Explosive Fireballs," J. Thermophysics and Heat Transfer (in press).
(63) Bazyn, T., Lynch, P., Krier, H., and Glumac, N.,"Combustion measurements of fuel rich aluminum and molybdenum oxide nano composite mixtures," Propellants, Explosives, and Pyrotechnics, Volume: 35 Issue: 2 Pages: 93-99, 2010.
(64) Lynch, P. T., Krier, H., and Glumac, N. G., "Micro-alumina particle volatilization temperature measurements in a heterogeneous shock tube," Combustion and Flame, Volume: 159 Issue: 2 Pages: 793-801, 2012.
(65) Glumac, N. G., Dong, W. K., and Jarrell, W. M., "Quantitative Analysis of Soil Organic Carbon Using Laser-Induced Breakdown Spectroscopy: An Improved Method," Soil Science Society of America, Volume: 74 Issue: 6 Pages: 1922-1928, 2010.
(66) Lazar, E., Elliott, G., and Glumac, N. G., "Energy Deposition Applied to a Transverse Jet in a Supersonic Crossflow," AIAA Journal, Volume: 48 Issue: 8 Pages: 1662-1672 AUG 2010
(67) Sharma M.; Austin J. M.; Glumac N. G., "NO and OH Spectroscopic Vibrational Temperature Measurements in a Postshock Relaxation Region," AIAA Zhurnal, Volume: 48 Issue: 7 Pages: 1434-1443 JUL 2010
(68) Lynch, P. T., Krier, H., and Glumac N.G., "Emissivity of Aluminum-Oxide Particle Clouds: Application to Pyrometry of Explosive Fireballs," Journal of Thermophysics and Heat Transfer, Volume: 24 Issue: 2 Pages: 301-308 APR-JUN 2010

PATENTS

US Patent 5876683, "Combustion Flame Synthesis of Nanophase Materials," March 1999

CURRENT AND PREVIOUS CONTRACTS OR SUB-CONTRACTS AWARDED BY

National Science Foundation
Defense Threat Reduction Agency
Office of Naval Research
Department of Commerce
New Jersey Space Consortium
American Chemical Society
Air Force Office of Scientific Research
Ballistic Missile Defense Organization

GRADUATE STUDENTS ADVISED

Degrees awarded

18 Master's students (Steven Bailey, Jason Abon, Shaun Chan, Joshua Felts, Kelly Aita, Nagraj Shankar, Catherine Roodhouse, Jonathan Brown, Randall Bill, Brian Fant, Kim Chesterfield, Brian Fant, John Rudolphi, Patrick Lynch, David Chonowski, Jeff Mason, Drew Coverdill, Brad Horn)
11 Ph.D students (Navin Khadiya, Andrei Colibaba, Wilson Chiu (co-advised with Yogesh Jalurian), Yijia Chen (co-advised with Bernard Kear), Tim Bazyn, John Rudolphi, Patrick Lynch and Brad Lemke (co-advised with Herman Krier), Tailai Hu, Nagraj Shankar, Eli Lazar (co-advised with Greg Elliott)

Degrees in progress

4 Masters (Michael Clemenson, David Allen, Brad Sanders, Haochen Ke)
3 Ph.D. (Guisseppe Kalman, Jennifer Mott Puker, Lance Kingston)

AWARDS AND HONORS

1997 NSF CAREER Award recipient
1999 AIAA Annual Meeting, Best Paper Award
2003 M&IE Cannon Faculty Scholar Award
2009 AIAA Annual Meeting, Best Paper Award

PROFESSIONAL MEMBERSHIPS

ASME, The Combustion Institute, AIAA