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Research Summary:

My current research involves the development of laser-based instrumentation for investigating the interaction of light with nano-scale materials. Current instruments include a near-field scanning optical microscope, a confocal Raman microscope, and an ultrafast transient absorption system. I also provide user support and training for most of the laser-based instruments at the CNM.

Awards:

- Argonne Pacesetter Award (2011), Workshop on Applications of Raman Microscopy to Nanoscience
- Argonne Pacesetter Award (2002), Design and construction of Terawatt Ultrafast High-Field Facility
- Argonne Director's Award (1997), Patent for molecular switch
- R&D 100 Award (1993), Development of molecular switch
- Argonne Pacesetter Award (1993), Development of molecular switch

Selected Recent Publications:

- "Stimuli-responsive Magnetic Nanomicelles as Multifunctional Therapeutic and Imaging Agents," D-H. Kim, E. A. Vitol, J. Liu, S. Balasubramanian, **D. J. Gosztola**, E. Cohen, V. Novosad, and E. A. Rozhkova; *Langmuir*, **2013**, In Press.
- "CO₂ Pre-activation in Photo-induced Reduction Via Surface Functionalization of TiO₂ Nanoparticles," D. Finkelstein-Shapiro, S. J. Petrosco, N. Dimitrijevic, **D. Gosztola**, K. A. Gray, T. Rajh, P. Tarakeshwar, and V. Mujica; *J. Phys. Chem. Lett.*, **2013**, In Press.
- "Effects of Solvent on the Furfuryl Alcohol Polymerization Reaction – UV Raman Spectroscopy Study," T. Kim, R. S. Assary, H. Kim, C. L. Marshall, **D. J. Gosztola**, L. A. Curtiss, and P. C. Stair; *Catalysis Today*, **2013**, In Press.

- “Self-Assembly of Highly Ordered Peptide Amphiphile Metallo-porphyrin Arrays,” H. Fry, J. Garcia, M. Medina, U. Ricoy, **D. Gosztola**, M. Nikiforov, L. Palmer, and S. Stupp; *J. Am. Chem. Soc.*, **2012**, 134(36), 14646-14649.
- “On the Origin of Photoluminescence in Silicon Nanocrystals: Pressure-Dependent Structural and Optical Studies,” D. C. Hannah, J. Yang, P. Podsiadlo, M. Chan, A. Demortiere, **D. J. Gosztola**, E. V. Shevchenko, V. B. Prakapenka, G. C. Schatz, U. Kortshagen, and R. D. Schaller; *Nano Lett.*, **2012**, 12(8), 4200-4205.
- “Dynamics of Interfacial Charge Transfer to Formic Acid, Formaldehyde and Methanol on the Surface of TiO₂ Nanoparticles and Its Role in Methane Production,” N. Dimitrijevic, I. Shkrob, **D. Gosztola**, and T. Rajh; *J. Phys. Chem. C*, **2012**, 116(1), 878–885.
- “Mechanical Damping of Longitudinal Acoustic Oscillations of Metal Nanoparticles in Solution,” M. Pelton, Y. Wang, **D. Gosztola**, and J. Sader; *J. Phys. Chem. C*, **2011**, 115(48), 23732-23740.
- “Acid-catalyzed Furfuryl Alcohol Polymerization: Characterizations of Molecular Structure and Thermodynamic Properties,” T. Kim, R. S. Assary, C. L. Marshall, **D. J. Gosztola**, L. A. Curtiss, and P. C. Stair; *ChemCatChem*, **2011**, 3(9), 1369-1511.
- “Tailoring the Surface Properties and Carrier Dynamics in SnO₂ Nanowires,” A. Kar, M. A. Stroschio, M. Meyyappan, **D. J. Gosztola**, G. P. Wiederrecht, and M. Dutta; *Nanotechnology*, **2011**, 22(28), 285709:1-7.
- “Utilizing Chemical Raman Enhancement: A Route for Metal Oxide Support-based Biodetection,” S. Hurst, H. Fry, **D. Gosztola**, and T. Rajh; *J. Phys. Chem. C*, **2011**, 115(3), 620-630.
- “Designed Ultrafast Optical Nonlinearity in a Plasmonic Nanorod Metamaterial Enhanced by Nonlocality,” G. A. Wurtz, R. Pollard, W. Hendren, G. P. Wiederrecht, **D. J. Gosztola**, V. A. Podolskiy, and A. V. Zayats; *Nature Nanotech.*, **2011**, 6(2), 106-110.
- “Optical and Electrical Measurement of Energy Transfer between Nanocrystalline Quantum Dots and Photosystem I,” H. Jung, G. Gulis, S. Gupta, K. Redding, D. J. Gosztola, G. P. Wiederrecht, M. A. Stroschio, and M. Dutta; *J. Phys. Chem. B*, **2010**, 114(45), 14544–14549.
- “Size-Dependent Amorphization of Nanoscale Y₂O₃ at High Pressure,” L. Wang, W. Yang, Y. Ding, Y. Ren, S. Xiao, B. Liu, S. V. Sinogeikin, Y. Meng, **D. J. Gosztola**, G. Shen, R. J. Hemley, W. L. Mao, and H.-k. Mao; *Phys Rev. Lett.*, **2010**, 105(9), 095701.
- “Photoluminescence Spectroscopy and Lifetime Measurements from Self-assembled Semiconductor-metal Nanoparticle Hybrid Arrays,” M. Haridas, J. K. Basu, D. J. Gosztola, and G. P. Wiederrecht; *Appl. Phys. Lett.*, **2010**, 97(8), 083307.
- “The Role of Order, Nanocrystal Size, and Capping Ligands in the Collective Mechanical Response of Three-Dimensional Nanocrystal Solids,” P. Podsiadlo, G. Krylova, B. Lee, K. Critchley, P. Ashby, D. Gosztola, D. Talapin, and E. Shevchenko; *J. Am. Chem. Soc.*, **2010**, 132(26), 8953–8960.