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Ph.D., Physical Chemistry,
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Research summary:

My research focus is to achieve control of optical energy and its conversion on the nanometer scale by combining the properties of metal, organic, semiconductor, and dielectric materials to create new, hybrid electronic and optical states. Examples of specific recent topics include (a) ultrafast excitation processes in hybrid nanomaterials, (b) nanophotonic structures for the concentration and conversion of solar energy, and (c) novel optical microscopy approaches to visualize quantum and nanoscale phenomena.

Awards/Honors:

2016 Fellow, American Physical Society

2013 Argonne National Laboratory Distinguished Service Award

2005 Argonne National Laboratory Director's Award

2004 Argonne National Laboratory Pacesetter Award

1998 Presidential Early Career Award for Scientists and Engineers (PECASE)

1998 Department of Energy Young Scientist Award

1996 R&D 100 Award for development of a Photorefractive Image Processor

Selected publications (of ~165):

- “Nanomaterials and Sustainability,” G. P. Wiederrecht, R. Bachelot, H. Xiong, K. Termentzidis, A. Nomine, J. Huang, P. V. Kamat, E. A. Rozhkova, A. Sumant, M. Ostraat, P. K. Jain, C. Heckle, J. Li, K. Z. Pupek, *ACS Energy Lett.* **8**, 3443 (2023).
- “Unconventional optical properties of 2D Janus SMoSe induced by structural asymmetry,” J. Zhang, X. Wen, T. Zhai, G. P. Wiederrecht, J. Lou, *2D Materials* **9**, 035006 (2022).
- “Bright and stable light-emitting diodes made with perovskite nanocrystals stabilized in metal-organic frameworks,” H. Tsai, S. Shrestha, R. A. Vila, W. Huang, C. Liu, C.-H. Hou, H.-H. Huang, X. Wen, M. Li, G. Wiederrecht, Y. Cui, M. Cotlet, X. Zhang, X. Ma, W. Nie, *Nat. Photon.* **15**, 843 (2021).
- “Ghost imaging second harmonic generation microscopy,” X. Wen, S. Adhikari, C. L. Cortes, D. J. Gosztola, S. K. Gray, G. P. Wiederrecht, *Appl. Phys. Lett.* **116**, 191101 (2020).

- “Anisotropic photoluminescence from isotropic optical transition dipoles in semiconductor nanoplatelets,” X. Ma, B. T. Diroll, W. Cho, I. Fedin, R. D. Schaller, D. V. Talapin, G. P. Wiederrecht, *Nano Lett.* **18**, 4647 (2018).
- “Enhanced generation and anisotropic Coulomb scattering of hot electrons in an ultra-broadband plasmonic nanopatch metasurface,” M. E. Sykes, J. W. Stewart, G. M. Akselrod, X.-T. Kong, Z. Wang, D. J. Gosztola, A. B. F. Martinson, D. Rosenmann, M. H. Mikkelsen, A. O. Govorov, G. P. Wiederrecht, *Nature Comm.* **8**, 986 (2017).
- “Size-dependent biexciton quantum yields and carrier dynamics of quasi-two-dimensional core/shell nanoplatelets,” X. Ma, B. T. Diroll, I. Fedin, W. Cho, R. D. Schaller, D. V. Talapin, S. K. Gray, G. P. Wiederrecht, D. J. Gosztola, *ACS Nano* **11**, 9119 (2017).
- “Ultrafast optical modulation of second- and third-harmonic generation from cut-disk-based metasurfaces,” G. Sartorello, N. Olivier, J. Zhang, W. Yue, D. J. Gosztola, G. P. Wiederrecht, G. Wurtz, A. V. Zayats, *ACS Photonics* **3**, 1517 (2016).
- “Anomalous ultrafast dynamics of hot plasmonic electrons in nanostructures with hot spots,” H. Harutyunyan, A. B. F. Martinson, D. Rosenmann, L. K. Khorashad, L. V. Besteiro, A. O. Govorov, G. P. Wiederrecht, *Nat. Nanotech.* **10**, 770 (2015).
- “Damping of coherent acoustic vibrations by nanosized pores in colloidal hypersonic crystals,” G. Zhu, G. P. Wiederrecht, C. Ling, S. Wu, D. Banerjee, and K. Yano, *Appl. Phys. Lett.* **105**, 051903 (2014).
- “Energy transfer from quantum dots to metal-organic frameworks for enhanced light harvesting,” S. Jin, H.-J. Son, O.K. Farha, G.P. Wiederrecht, J.T. Hupp, *J. Am. Chem. Soc.* **135**, 955 (2013).
- “Light Harvesting and Ultrafast Energy Migration in Porphyrin-Based Metal-Organic Frameworks,” H.-J. Son, S. Jin, S. Patwardhan, S. Wezenberg, N.C. Jeong, M. So, C. Wilmer, A. Sarjeant, G. Schatz, R. Snurr, O. Farha, G. P. Wiederrecht, J. Hupp, *J. Am. Chem. Soc.* **135**, 862 (2013).
- “Ultrafast charge transfer from highly reductive ZnTe/CdSe type II quantum dots,” S. Jin, J. Zhang, R. D. Schaller, T. Rajh, G. P. Wiederrecht, *J. Phys. Chem. Lett.* **3**, 2052 (2012).
- “Visualizing charge movement near organic heterostructures with ultrafast time resolution via an induced Stark shift,” G. P. Wiederrecht, N. C. Giebink, J. Hranisavljevic, D. Rosenmann, A.B.F. Martinson, R. D. Schaller, and M. R. Wasielewski, *Appl. Phys. Lett.* **100**, 113304 (2012).
- “Kinetics of J-aggregate formation on the surface of Au nanoparticle colloids,” A. Vujacic, V. Vasic, M. Dramicanin, S. P. Sovilj, N. Bibic, J. Hranisavljevic, G. P. Wiederrecht, *J. Phys. Chem. C* **116**, 4655 (2012).
- “Reduced Heterogeneity of Electron Transfer into Polycrystalline TiO₂ Films: Site-Specific Kinetics Revealed by Single Particle Spectroscopy,” S. Jin, A. B. F. Martinson, and G. P. Wiederrecht, *J. Phys. Chem. C* **116**, 3097 (2012).
- “Resonance-shifting to circumvent reabsorption loss in luminescent solar concentrators,” N. C. Giebink, G. P. Wiederrecht, and M. R. Wasielewski, *Nature Photon.* **5**, 694 (2011).
- “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.* **6**, 107 (2011).
- “Self-consistent model of light-induced molecular motion around metallic nanostructures,” M. Juan, J. Plain, R. Bachelot, P. Royer, S. K. Gray, G. P. Wiederrecht, *J. Phys. Chem. Lett.* **1**, 2228 (2010).