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Research summary:
Our group objective 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, combined states of light and matter. My current research focuses on (a) ultrafast excitation processes of plasmons and their interactions with organic molecular excitations, (b) new microscopies with spatial resolution below the diffraction limit, and (c) parallel near-field optical lithographies to create hybrid nanostructures over large areas.

Selected recent publications:

G. P. Wiederrecht, J. E. Hall, A. Bouhelier, "Control of Molecular Energy Redistribution Pathways via Surface Plasmon Gating," *Phys. Rev. Lett.* **98**, 083001 (2007).

S. Jeon, V. Malyarchuk, J. A. Rogers, G. P. Wiederrecht, "Three dimensional nanofabrication by two photon lithography in a single exposure step," *Opt. Express* **14**, 2300-8 (2006).

A. Bouhelier, R. Bachelot, G. Lerondel, S. Kostcheev, P. Royer, and G. P. Wiederrecht, "Surface Plasmon Characteristics of Tunable Nonlinear Photoluminescence in Single Au Nanorods," *Phys. Rev. Lett*. **95**, 267405 (2005).

A. Bouhelier, G. P. Wiederrecht, "Surface Plasmon Rainbow Jets," *Opt. Lett.* **30**, 884-886 (2005).

C. Hubert, A. Rumyantseva, G. Lerondel, J. Grand, S. Kostcheev, A. Vial, R. Bachelot, P. Royer, S.-H. Chang, S. K. Gray, G. P. Wiederrecht, G. C. Schatz, "Near-field Photochemical Imaging of Noble Metal Nanostructures," *Nano Lett.* **5**, 615-618 (2005).

G. P. Wiederrecht, G. A. Wurtz, J. Hranisavljevic, "Coherent Coupling of Molecular Excitons to Electronic Polarizations of Noble Metal Nanoparticles," *Nano Lett.* **4**, 2121-25 (2004).