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Relaxation Dyanamics of Electronically Excited Metal Nanoclusters THOMAS GREEN, KENNETH KNAPPENBERGER, Florida State University — Recent advances describing optical properties and relaxation dynamics of electronically excited nanoclusters are presented. Femtosecond time-resolved transient absorption and magneto-photoluminescence data were used to study properties of excited states located near the HOMO-LUMO energy gap for anionic and neutral $Au_{25}(SCH_2CH_2Ph)_{18}$. With these data, we show the optical properties of these nanoclusters are charge-state dependent. Transient absorption measurements employing NIR probe pulses reveal a previously unobserved relaxation process for neutral nanoclusters with a lifetime of several hundred picoseconds. Information regarding the electronic g-factor and photoluminescence rates of these clusters were obtained from temperature- and magnetic field-dependent measurements. Together these data indicate neutral nanocluster emission proceeds through multiple channels, including both high- and low-spin states. Quantum-confined, ligand-protected gold nanoclusters represent a class of nanomaterials with potential application across a wide range of fields. These results will impact several technologies, including: optical imaging, energy conversion, and catalysis, which all feature the nanocluster platform.

Kenneth Knappenberger
Florida State University

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