

# Ph.D. THESIS DEFENSE

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Enabling Single Molecule Fluorescence Microscopy Investigations of  
Chemical Reactions Using a Spiroconjugated BODIPY Fluorophore

Goldsmith Group

Monday December 10<sup>th</sup> at 3:00 p.m.  
Room 9341

A major thrust of research in the Goldsmith Group involves studying catalyst reaction dynamics at the single-molecule level using fluorescence microscopy. We have explored surface attachment chemistry for immobilizing molecules such as transition-metal catalysts on surfaces. With these immobilized molecules in hand, we have also investigated the dynamics of the initiation of molecular, supported palladium catalysts. Later, unsupported molecules were synthesized with fluorescent labels for investigating reactions such as Ring Opening Metathesis Polymerization (ROMP). The emphasis of this presentation will be on an unexpected photophysical discovery made upon synthesizing and characterizing a BODIPY-labeled norbornene ROMP monomer along with the corresponding polymer. The monomer self-assembles into nanoparticles with qualitatively different properties as compared to the polymerized species and the monomer nanoparticles exhibit several unique emissive properties. After extensive characterization, we have developed a mechanism consistent with the discovery which involves an interesting interplay between physical structure and electronic properties.

