

PHYSICAL CHEMISTRY SEMINAR



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4:00 PM

Young Hall 2033

“Assessing Hybrid Molecular Platforms for Next Generation Quantum Technologies”



Abstract: Quantum control over light and matter is poised to enable future capabilities beyond the reach of current technologies in chemical synthesis, energy harvesting, and information processing and storage. Despite this promise, the fundamental physical drivers of quantum control in proposed platforms remain unclear. In this talk, I will present results from fundamental studies of structure-property relationships in two disparate hybrid molecular systems of emerging interest to the chemistry community. First, I will present results from our studies on the chemistry and properties of mid-gap states formed in self-assembled quantum nanostructures. These results indicate synthetic routes to the deterministic design of structural defects for the emission of narrowband light spectra central to solution-processed single photon sources and entangled photon generation in the established telecommunications band. Second, I will present results in the design, fabrication, and characterization of cavity polariton samples containing single and multiple chromophores. These results suggest the entanglement of light and matter states mediated by polariton formation opens new avenues to control ultrafast molecular photophysics and intermolecular interactions on truly quantum footing. These studies demonstrate the wealth of fundamental physical information central to the development of next generation molecular quantum technologies that can be attained from informed materials design and advanced spectroscopic characterization.