"Synthesis and Characterization of Inverse Opals, a Class of 3D Photonic Crystal"

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Photonic crystals are materials that have a lattice of dielectric material with a periodicity on the order of optical wavelengths. Analogous to how the periodic potential of a semiconductor crystal determines the allowed frequencies of electrons within the semiconductor, the periodicity of the dielectric in photonic crystals determines the allowed (and disallowed!) frequencies of light that can exist within them, and thus their title of "semiconductors for light." The unique abilities of photonic crystals to govern the propagation and generation of light give them great potential as components in optical and optoelectronic devices.

Inverse opals are a class of three-dimensional photonic crystals that are based on self-assembled colloidal crystals templates. By using self-assembly, we are able to generate periodicities that are on the order of visible and near-infrared wavelengths, which are difficult to realize in three-dimensional geometries through other techniques. In this talk I will cover some of the issues encountered in the synthesis of these inverse opals, in both the templating and inversion processing, as well as outlining some of the future avenues we hope to take in experiments involving these materials.