Design and Synthesis of Highly Porous Coordination Cages

**Abstract**

Porosity in network solids, including zeolites, activated carbons, and metal-organic frameworks, has been widely interrogated for decades. In molecular metal-organic systems, however, it is a relatively novel phenomenon. This is somewhat surprising given the fact that porous organic cages can display surface areas that rival those of metal-organic frameworks. This talk will focus on the design, synthesis, and characterization of highly porous coordination cages for small molecule storage applications. Further, it will detail the intriguing interplay between surface area and solubility in a class of paddlewheel-based cages. We have recently shown that these materials, which conceptually serve as soluble metal-organic framework analogs, display impressive porosity under specific synthesis and activation conditions. Although these cages are typically amorphous upon desolvation, the utilization of pillaring ligands endows the materials with high crystallinity and compatibility with diffraction methods for the identification and optimization of gas binding sites. The design, synthesis, and characterization of an exciting new class of materials, porous salts, will also be discussed.