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Synthesis and Fluorescent Properties of Molecular Tubes with Covalently Linked Anthracene Rings

Abstract

Tubular molecules and its nanometer-sized cavities play a key role in the selective binding, stabilization, and transportation of ions or small molecules. There are many examples of biological tubular assemblies (*e.g.* ion channels) and synthetic molecular tubes (*e.g.* carbon nanotube). However, it remains uncommon that molecular tubes provide both fluorescent properties and host capabilities. In this thesis, I report the preparation of novel aqueous molecular tubes containing covalently linked, three or four anthracene panels by multiple-step coupling reactions. The molecular tube bearing four anthracene rings has a well-defined hydrophobic cavity with a diameter of ~ 1 nm and showed unusual fluorescent properties in water through efficient host-guest energy transfer. In addition, the molecular tube with three anthracene rings has a subnanometer-wide cavity and carried out the selective encapsulation of linear molecules.