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Unique Host Functions of Coordination Nanocavities Surrounded by Anthracene Rings

Abstract

In nature, enzymes act as natural molecular hosts providing specific recognition capability toward various size and shape of substrates by their nanocavities. Rational designs of artificial molecular hosts are expected to exhibit greater recognition abilities beyond natural systems and provide additional chemical and physical functions. This thesis reports the unique functions of coordination nanocapsules containing anthracene panels upon encapsulation of various synthetic and biological compounds in aqueous solutions. For example, the capsule encapsulated various steroid hormones in the rigid nanospace and exhibited specific recognition behaviors in water. The highly emissive host-guest complexes were successfully prepared upon encapsulation of various fluorescent dyes. The polyaromatic nanospace of the capsule could significantly stabilize radical initiators against light and heating. The capsule bound oligo(ethylene glycol) compounds held in unique conformations. Furthermore, anisotropic expansion of the spherical capsule led to the synthesis of an elliptical coordination capsule.