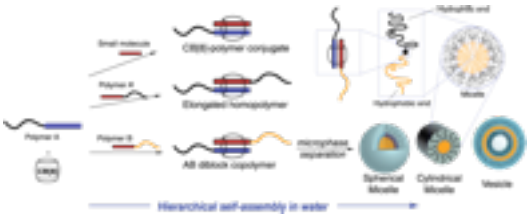
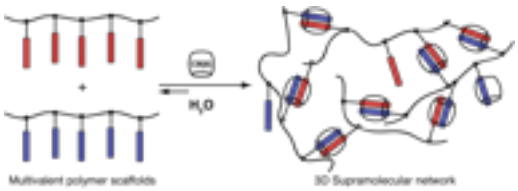
Cucurbiturils at the interface between supramolecular chemistry and materials science

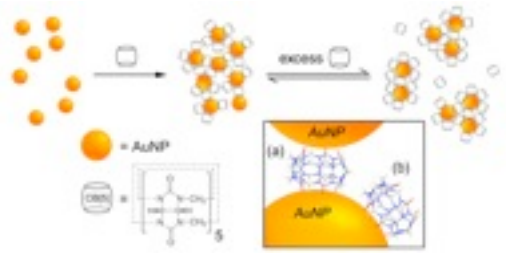
Our research interests include the development of controlled polymer architectures,[1] hybrid nanoparticle assemblies,[2] and the integration of dynamic supramolecular systems onto surfaces.[3] Using cucurbit[n]urils (CB[n]s) we adopt a simple bottom-up approach to achieve sophisticated designs which are directed at the preparation of novel photonic devices, high-density patterned media, and chemical and biological sensors.[4] Our CB[n] based host-guest systems exhibit dynamic self assembly and are capable of responding to stimuli (photochemical, chemical, and thermal) which allow for external control and function to be built into the materials. Modification of solution viscosity using multivalent polymers[5] and imidazolium based ionic liquids[6] have been accomplished through dynamic crosslinking in water using CB[n]s to produce colorful hydrogels and hierarchical architectures. Furthermore, polymer-inorganic composite materials can be readily prepared based on the CB[8] coupling of multivalent gold nanoparticles to copolymers.[7] When these systems are attached onto gold surfaces intricate control is achieved over the site-selective immobilization of colloids[3] and peptides.[8] This has great scope for the development of optical materials, chemical sensors and biological separations.



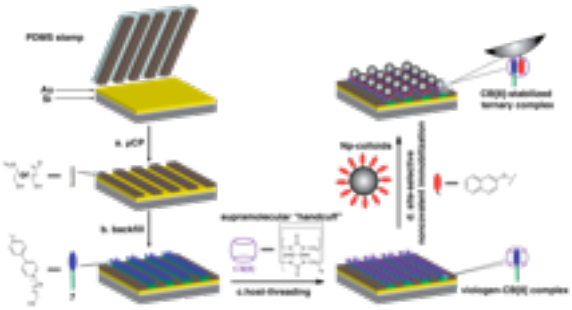
hierarchical self assembly



dynamic hydrogels



nanoparticle assembly



self-assembled surfaces

1. Rauwald, U.; Scherman, O. A. *Angew. Chem. Int. Ed.,* **2008**, *47*, 3950-3953.
2. Lee, T.C.; Scherman, O.A. *Chem. Commun.*, **2010**, *46*, 2338-2440.
3. Tian, F.; Cheng, N.; Nouvel, N.; Geng, J.; Scherman, O.A. *Langmuir*, **2010**, *26*, 5323-5328.
4. Zayed, J.M.; Nouvel, N.; Rauwald, U.; Scherman, O.A. *Chem. Soc. Rev.*, **2010**, *39*, 2806-2816.
5. Appel, E.A.; Rauwald, U.; Jones, S.; Zayed, J.M.; Scherman, O.A. *J. Am. Chem. Soc.*, **2010**, *132*, 14251-14260.
6. Jiao, D.; Biedermann, F.; Tian, F.; Scherman, O.A. *J. Am. Chem. Soc.*, **2010**, *132*, 15734-15743.
7. Coulston, R.; Jones, S.T.; Lee, T.C.; Appel, E.A.; Scherman, O.A. *Chem. Commun.*, **2011,** *47*, 164-166.
8. Tian, F.; Cziferszky, M; Jiao, D.; Wahlström, K; Geng, J; Scherman, O.A. *Langmuir*, **2011**, *27*, 1387-1390.