Anion Recognition and Hierarchical Assembly

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Ions are intimately related to the sustainable and technological development of our society, which has helped motivate creation of synthetic receptors to manage cations and anions. Of these, cations have enjoyed the lion's share of our attention ever since Werner's Nobel in 1913 recognized the reliability of their coordination chemistry. Anions have barely had a look in. These negative beasties are large, diffuse and difficult to pin down. Yet they can no longer be ignored. Their roles are diverse and span from the use of dihydrogen-phosphate ($H_2PO_4^-$) in fertilizer through to hexafluoro-phosphate (PF_6^-) used as the workhorse electrolyte in Li-ion batteries. This talk will cover recent works tackling these and other anions with shape-persistent and shape-dynamic receptors in the form of cyanostar macrocycles and triazole-based macrocycles, cages and foldamers. Along the way, the interplay between receptor and anion has grown more reliable, whether by design or discovery. This upgrade in status now allows us to learn the rules governing how anions can be used in self-assembly synthesis to control the structures and functions of advanced materials from supramolecular polymers to predictably fluorescent solids we call SMILES.