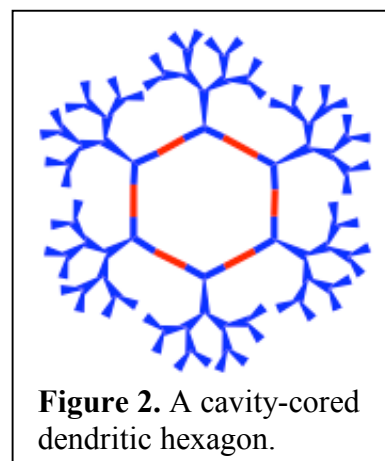
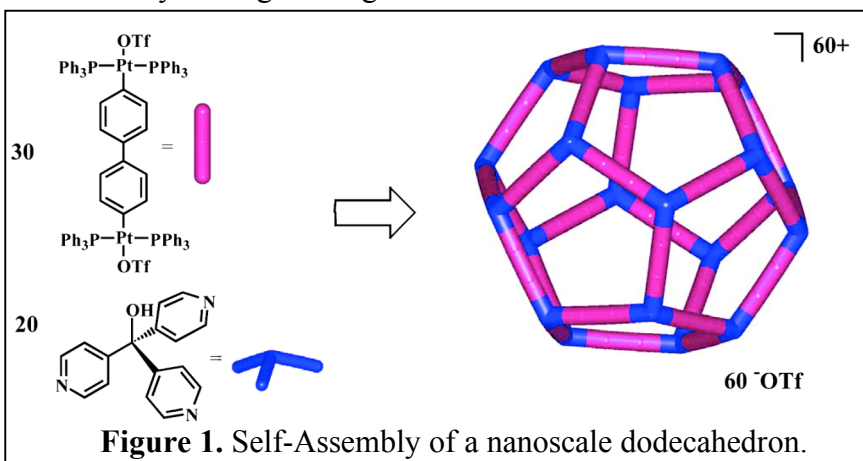


Abiological Self-Assembly: Predesigned Metallacycles and Metallacages via Coordination.

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The use of just two types of building blocks, linear and angular, in conjunction with symmetry considerations allows the rational design of a wide range of metallocyclic polygons and polyhedra via the coordination motif.¹⁻³ We have used this approach to self-assemble a variety of 2D supramolecular polygons such as triangles, rectangles, squares, hexagons, etc. as well as a number of 3D supramolecular polyhedra: truncated tetrahedra, trigonal prisms, cubooctahedra⁴ and dodecahedra.⁵ An example of the methodology is illustrated in Figure 1. More recently we have functionalized these rigid supramolecular scaffolds with different electroactive, host-guest, dendritic (Figure 2), and hydrophobic/hydrophilic moieties and have investigated the properties of these multifunctionalized supramolecular species. Additionally, we have begun to explore the self-assembly of 2D polygons and 3D polyhedra on a variety of surfaces with the aim of developing their potential to be used in device settings. These novel, supramolecular ensembles are characterized by physical and spectral means. The design strategy, formation, characterization and potential uses of these novel metallocyclic assemblies will be discussed, along with our recent results in crystal engineering.



1. High Symmetry Coordination Cages via Self-Assembly, S.R. Seidel, P.J. Stang, *Acc. Chem. Res.*, **2002**, 35, 972-983.
2. Self-Assembly of Discrete Cyclic Nanostructures Mediated by Transition Metals, S. Leininger, B. Olenyuk, P. J. Stang, *Chem. Rev.*, **2000**, 100, 853-908 .
3. Self-Assembly, Symmetry and Molecular Architecture: Coordination as the Motif in the Rational Design of Supramolecular Metallocyclic Polygons and Polyhedra, P. J. Stang, B. Olenyuk, *Acc. Chem. Res.*, **1997**, 20, 502-518.
4. Self-Assembly of Nanoscale Cubooctahedra by Coordination Chemistry, B. Olenyuk, J. A. Whiteford, A. Fechtenkötter, P. J. Stang, *Nature*, **1999**, 398, 796-799.
5. Self-Assembly of Nanoscopic Dodecahedra from 50 Predesigned Components, B. Olenyuk, M. D. Levin, J. A. Whiteford, J. E. Shield, P. J. Stang, *J. Am. Chem. Soc.*, **1999**, 121, 10434-10435.