Confinement of Metal–Organic Polyhedra in Silica Nanopores

Scientific Achievement
Metal-organic polyhedra (MOPs) confined in silica nanopores exhibit obviously increased H₂ adsorption capacity and thermal stability

Significance and Impact
The confinement avoids the aggregation of MOP molecules in solid state and demonstrates potential for future applications of MOPs

Research Details
- MOPs with identical geometries but different ligand functionality (i.e. tert-butyl, hydroxyl, and sulfonic groups) were incorporated into mesoporous silica
- In comparison with bulk MOPs which prefer to aggregate, MOPs confined in silica nanopores can be well dispersed, making the active sites and pores in the MOPs accessible
- The solubility of the MOP and the interaction between the MOP and the silica surface play crucial roles in MOP incorporation

Schematic of MOPs confinement in nanopores: After confinement in silica nanopores, the dispersibility of MOPs is greatly improved, making the active sites in the MOPs accessible. In contrast to bulk aggregated MOPs, the dispersed MOPs show apparently superior H₂ adsorption and thermal stability.

Work was performed at Texas A&M University