Chiral Magnetic States in Cobalt Nanorings

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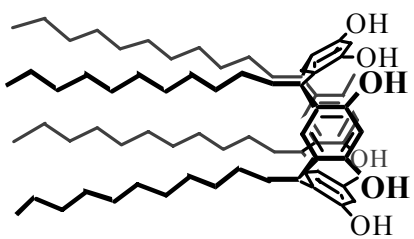
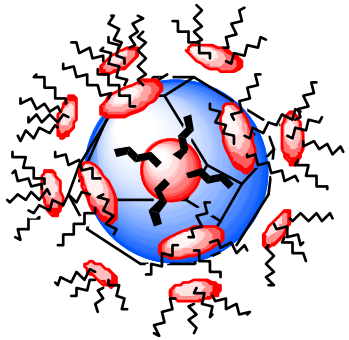
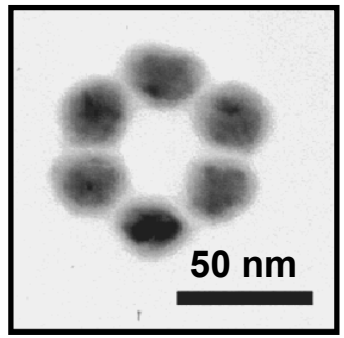


Resorcinarene 

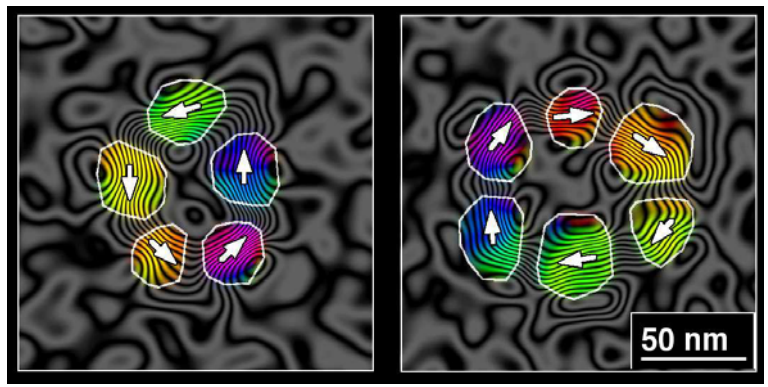


encapsulated
Co nanoparticles



self-assembled
Co nanorings

Nanometer-scale particles of cobalt encapsulated by macrocyclic surfactants known as resorcinarenes spontaneously assemble into rings less than 100 nm across. The Co nanoparticle rings, upon self-assembly, exhibit a collective magnetic state known as flux closure (FC). The PI's team uses electron holography to observe the FC states, which are stable at room temperature and can be switched by applying a magnetic field. Magnetic rings are currently being considered as memory elements in devices for long-term data storage and magnetic random-access memory (MRAM).



Electron holography images of flux closure states in rings of Co nanoparticles. Their polarization reverses upon exposure to an out-of-plane magnetic field.