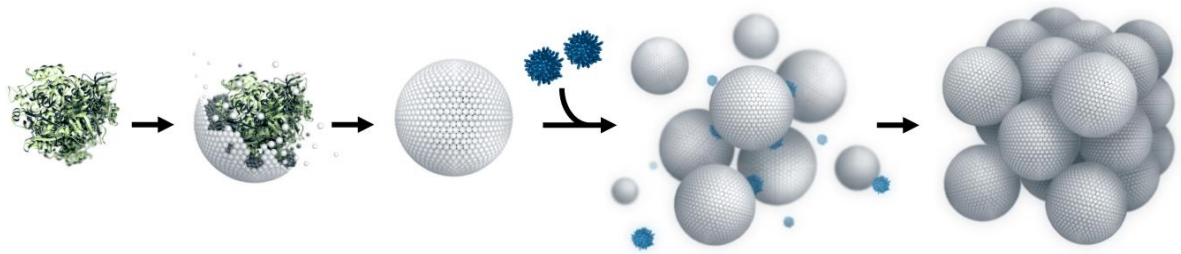
Bioinspired materials synthesis across multiple length scales using protein cages



Cargo Encapsulation Array formation

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Friday, February 14, 2020

3:00 – 4:00 PM

Music, room 160

For further information: www.csufresno.edu/biology

Abstract: Biology provides much inspiration to create advanced materials with properties beyond those currently available. Biomineralization is one example from which we can draw inspiration to develop inorganic-organic hybrid materials with unique chemical, physical and mechanical properties under mild synthetic conditions. An example is the biomineralization of iron oxides in the cage-like protein ferritin and a range of biomimetic nanoparticle syntheses using ferritin as a template. Virus capsids can also be exploited as versatile nanoscale platforms for materials synthesis. Conceptually they have two surfaces that are synthetically useful: the interior and the exterior of the cage. For example, these protein cages can be used as size constrained nanoscale reaction vessels to synthesize and accumulate nanoparticles inside of the cages. They can also accommodate the introduction of functionality such as cell-targeting capability, either chemically or genetically, on their exterior surface. Incorporation of multiple functionalities within these nanometer sized protein architectures have demonstrated their potential to serve as functional nanomaterials with various applications including in medical imaging and therapy. Furthermore, protein cage nanoparticles are ideal building blocks with which to construct higher order assemblies (i.e. 3D lattices) with potential collective behavior and properties arising from the interaction between the individual particles. This is, in part, possible because the size and morphology of the protein cages nanoparticles are very homogeneous and a wide range of functionalities can be imparted into the particles. Directed assembly of protein cage nanoparticles into superlattice materials has recently demonstrated. I will present some representative examples of new materials synthesis accomplished by using protein cage nanoparticles as nanoscale platforms.