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Self-assembly and properties of colloidal spheres

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Colloidal spheres have drawn tremendous interests in the past decades because they and their assemblies have the enhanced even novel properties and can find potential applications in coatings, catalysts, opto-electronic devices, surface-enhanced Raman scattering devices, solar cells, high-performance display units. Many physical and chemical methods have been developed to fabricate these colloidal spheres and their ordered superstructures. Recently, we have developed several novel methods, including "Pickering emulsification polymerization", "Nano-solid- -fluid assembly", "Oil-water interfacial self-assembly", etc., to fabricate these spheres and their assembles. For example, oil-water interfacial self-assembly has come to be considered an ideal strategy for the assembly of various low-dimensional nanostructures into nanofilms. The low-dimensional nanostructures are well dispersed in water, and then an oil phase is added to form an oil-water interface. After the addition of an appropriate amount of inducer, the decreased interfacial energy causes the nanostructures self-assembled into closely packed monolayer nanofilms at the interface. Very recently, we have developed this self-assembly procedure to fabricate hierarchical hybrid colloidal spheres and their assemblies, and further investigated their properties and potential applications in coatings, and other fields.

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