

Fabrication of Multi-functional Complex Colloidal Structures of Semiconductor Quantum Dots

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Recently nanometer-sized structures with at least one dimension smaller than the critical size for a given property of a material have attracted considerable attention, mainly due to their size-dependent electronic and optical properties and flexible processing chemistry. Especially semiconductor quantum dots(QDs) or nanocrystals(NCs) show different emission colors and electron transportation properties depending on their size. Based on these special characteristics called quantum confinement effect, their application is recently enlarged as LEDs, lasers, and bio-sensors. Our group have previously presented the fabrication of binary colloidal clusters with dielectric particles using emulsion templates. We can predict that these complex structures give us the full band gap like diamond structure or new electrical and optical structures. In here we fabricate multi-functional binary colloidal clusters by using various semiconductor QDs as interstitial materials and Au shell particles with latex cores. When Au shell particles having good not only conductivity and but also reflectivity are coupled with semiconductor QDs, there are remarkable enhancements of electrical and optical properties of QDs for multi-functional devices.