

Optical Properties of Colloidal Suspensions Containing Quantum Dot/Silica Hybrid Particles

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Quantum dots (QDs) have drawn increasing interest for use in many areas because of their unique optical properties. For instance, emission wavelength can be controlled by changing the size of the QDs. It is well known that the fluorescence properties of suspensions are affected by the concentration and dispersion state of the particles in the suspensions. Photoluminescence (PL) quantum efficiency (QE) changes due to fluorescence quenching as the concentration of QDs increases or as aggregation occurs; this is attributed to reabsorption, electronic coupling, and energy transfer between QDs. In this work, we select silica/QD/silica (SQS) hybrid particle suspension as a model system. We controlled the concentration and dispersion state of hybrid particles in suspension, and checked the resulting changes in QE. This results will not only our understanding on the fluorescence properties of colloidal suspensions containing particles, but also institute a novel method for estimation of particle dispersion state based on fluorescence properties.