

Fabrication of wrinkled silica-quantum dot hybrid particles nanocomposite for display application

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Semiconductor nanocrystals (Quantum dots, QDs), have been intensely studied for display application because of their unique optical properties such as a high photoluminescence quantum yield, broad absorption and narrow emission bands. Also, the emission peak of QDs can be easily controlled by changing their size. For display application, QDs have been used in a polymer matrix. However, QD is not well-dispersed into polymer matrix. It causes decrease of stability and quantum yield. To overcome this problem, we immobilized QDs into wrinkled silica nanoparticles (wSNs).

wSNs are silica nanoparticles having wrinkle on their surface. It can be synthesized in water-oil-surfactant system. By this unique surface structure, it scatters light more than spherical silica nanoparticles. Also, its surface can be easily modified because of silanol group. To use wSN as a substrate particle to disperse QDs into film, their surface was modified. Next, QDs are embedded into wSNs by swelling method. We fabricated nanocomposite dispersing wSQs (QD embedded wSNs). We believe this study suggests fascinating materials for dispersing QDs in polymer films and scattering light, simultaneously.