

Improving Dispersion of Quantum Dot / Polydimethylsiloxane(PDMS) Composite Film for High Luminescent Efficiency of White Light Emitting Diode By Ligand Exchange Process

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White Light-Emitting Diode (WLED) has potential applications in solid-state lighting source and liquid crystal display (LCD) backlighting, and has gained much attention due to its eco-friendly, energy-efficient, and cost-effective features. One of routes for production of WLED is to use quantum dots (QD-LEDs). The most important parameters in the QD-LED performance is luminescence efficiency of the QD/polymer composite film. Since aggregation of QDs is well known to cause luminescence quenching, it is critical to achieve good dispersion of QDs at high concentration in polymer film for high efficiency. Here we investigate dispersion of QDs in QD/polymer film to enhance luminescence efficiency. For QD/polymer composites, we used Core/Shell QDs and polydimethylsiloxane (PDMS) as a polymer matrix. To improve QD dispersion in PDMS, we functionalized the surface of QDs with various ligands, and compared the QD dispersion and physical/chemical characteristics of resulting films. We believe that this should enable easy dispersion of QDs in polymer matrix, and hence improvement in the optical performance of the resulting QD-LED device.