Optical and Electrical Properties of All-Quantum Dot Thin Films Fabricated by the Layer-by-Layer Deposition Method

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The *layer-by-layer deposition method* has been considered to be one of the most promising methods to incorporate nano-objects into controlled structures or phases. In present study, we demonstrate the preparation of all-QD multilayer films to fully take advantage of its promising optical and electronic properties in terms of high quantum efficiency, photophysical stability, and bandgap tunability. The all-QD multilayer films were prepared by sequentially depositing positively and negatively charged QDs onto pretreated substrates. The multilayer films demonstrate the linear growth behavior with the increase in the number of QD bilayers. Oscillating periodic spectra is observed in both UV-vis. and PL spectra without adding high refractive index layers, which is in good agreement with the theoretical predictions based on the microcavity model. In addition, the energy transfer from green to red quantum dot layers is highly effective compared with polyelectrolyte – quantum dot multilayers. These characteristics suggest that all-quantum dot films are suitable for optoelectronic applications such as light emitting diodes, chemo / bio sensors, and lasing materials.