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**Precise Color Tuning via Hybrid Quantum Dot Light-Emitting Electrochemical Cells** AMANDA NORELL BADER, ANTON ILKEVICH, JANELLE LEGER, Western Washington University — Quantum dots (QDs) are of much interest as the active emitter in an organic light-emitting device due to their size-tunable band-gap energies, allowing device color to be carefully tuned over the entire spectrum by simply varying the size of QDs used. Colloidal QDs are compatible with solution processing techniques used to fabricate polymer light-emitting devices, resulting in inexpensive, low temperature, large area device fabrication on flexible substrates. QDs are more stable and have higher photoluminescence efficiency than organic emitters, but their efficacy in a typical polymer LED is limited by an insulating surface ligand layer that presents a charge tunneling barrier. This leads to unwanted emission from the polymer host material. A light-emitting electrochemical cell (LEC) structure presents a novel solution to this problem by limiting the emissive region thickness in the polymer/QD film. Emission spectra of QD-LECs composed of a two different sizes of QDs blended into a single polymer film show better color purity than polymer-only LECs, with nearly pure emission from the QDs. Relative intensity of the two narrow QD emission peaks is precisely controlled by varying the mass ratio between the QDs, directly changing device color. This novel QD-LEC structure has the potential to improve the performance of polymer optoelectronic devices, particularly in solid-state lighting.

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