The key parameters to improve the efficiency CdSe/CdS quantum rod light emitting diodes

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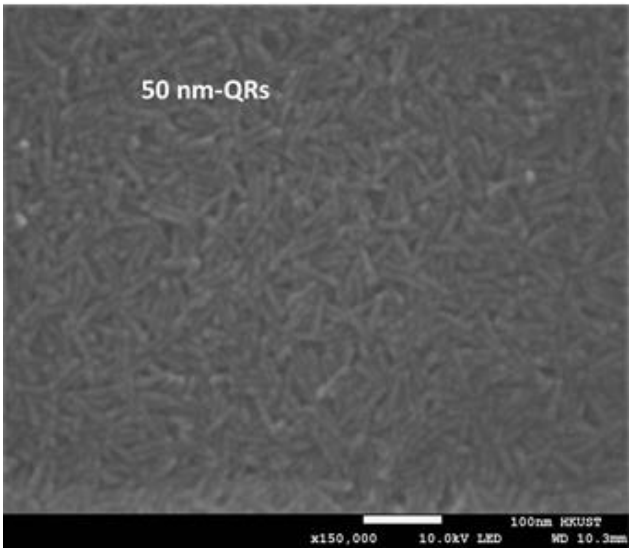
A facile but effective method to improve the external quantum efficiency (EQE < 20) of the quantum dot light emitting diodes (QLEDs) by changing QDs emissive layer with quantum rods (QRs). The QRs offers the polarized emission and higher outcoupling efficiency then the QDs, and QRs can double the EQE of the device. However, the synthesis of QRs covering with whole visible spectrum and forming a void free smooth-uniform QRs layer is much more complicated than the QDs due to large bathochromic shift of the w-CdSe seeds during the synthesis and QRs easily overlap each other during the spin coating. Herein, we report the key parameters considered for improving the efficiency of CdSe/CdS core/shell QRLEDs. The length and shape of the QR seriously influence QRs film packing density and resulted more voids in the QRs emissive layer by increasing the length of the rod, which causes the serious leakage current and FRET in the device. To confirm this, we fabricated a QRLEDs with different length of the QRs are 20 and 50 nm and having the same diameter. The turn on voltage, luminance and EQE of the devices shown in Table 1. The SEM results confirm that the 20 nm length QRs films has more uniform and less voids then the 50 nm QRs.



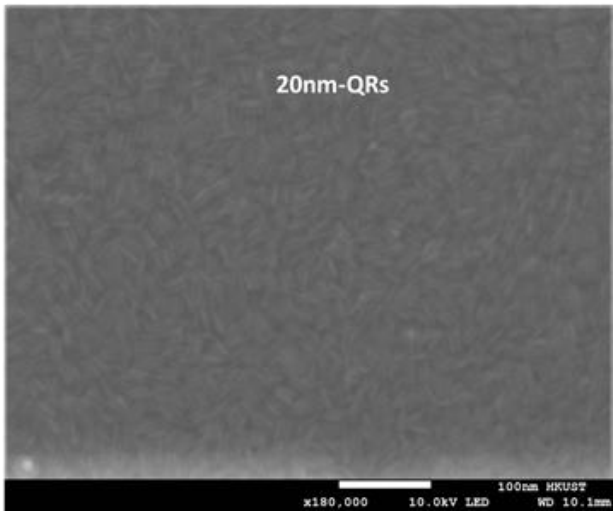


Fig 1(a) 50 nm length QRs and 1(b) 20 nm length QRs.

Table1. summarizes the performance of the QRLEDs

Device	Von (V)	EQE (%)	Luminance (cd/m^2)
20 nm	2.2	5	7500
50 nm	3.1	2	900

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