

Eco-Friendly Emissive ZnO-Graphene QD for Bluish-White Light-Emitting Diodes

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Recently, most studies concerning inorganic CdSe/ZnS quantum dot (QD)-polymer hybrid LEDs have been concentrated on the structure with multiple layers [1,2]. The QD LEDs used almost CdSe materials for color reproduction such as blue, green and red from the light source until current. However, since Cd is one of six substances banned by the Restriction on Hazardous Substances (RoHS) directive and classified into a hazardous substance for utilization and commercialization as well as for use in life, it was reported that the use of CdSe is not suitable to fabricate a photoelectronic device. In this work, we demonstrate a novel, simple and facile technique for the synthesis of ZnO-graphene quasi-core-shell quantum dots utilizing graphene nanodot in order to overcome Cd material including RoHS materials. Also, We investigate the optical and structural properties of the quantum dots using a number of techniques. In result, At the applied bias 10 V, the device produced bluish-white color of the maximum brightness 1118 cd/m² with CIE coordinates (0.31, 0.26) at the bias 10 V.

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References

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