Yasser Hassan, J Nanomater Mol Nanotechnol 2018, Volume 7
DOI: 10.4172/2324-8777-C7-038

Facile synthesis of air-stable and highly luminescent red- and blue-emitting perovskite nanocrystals for efficient light emitting devices

Yasser Hassan
Oxford Univeristy, UK

Metal halide perovskites are promising candidates for use in light emitting diodes (LEDs), due to their potential for colour tuneable and high luminescence efficiency. While recent advances in perovskite-based light emitting diodes (PeLEDs) have resulted in external quantum efficiencies (EQEs) exceeding 12.4 % for the green emitters, and infrared emitters based on 3D/2D mixed dimensional perovskites have exceeded 15%, the EQEs of the red and blue emitters still lag behind. A critical issue to date is creating highly emissive and stable perovskite emitter with the desirable emission band gap (especially red and blue region) to achieve full-colour displays and white LEDs. A critical issue to date is creating highly emissive and stable perovskite emitter with the desirable emission band gap (especially red and blue region) to achieve full-colour displays and white LEDs. Herein, we report the preparation and characterization of a highly luminescent air-stable suspension of both red cubic $CH_3NH_3PbI_3$ perovskite nanocrystals (NCs) and high-quality, stable blue colloidal perovskite $CsPbBr_3$ nanoplatelets. Both the red NCs and the blue nanoplatelets exhibit controlled optoelectronic properties with colour purity in the recommended emitting regions (according to Rec. 2020) of band gaps of 1.96 and 2.65 eV, respectively. Photoluminescence quantum yields (PLQY) exceeding 95% for the red NCs and 92% for the blue was achieved. We demonstrate the utility of these nanocrystals in PeLEDs.

Biography

Yasser Hassan has his expertise in the synthesis of semiconductor nanocrystals (NCs) and their application in the state-of-the-art engineering of efficient and low-cost thin-film optoelectronic devices, solar cells and light diodes (LEDs). He is currently a Postdoctoral Research Associate at the Oxford Photovoltaics and optoelectronics Devices Group under Prof. Henry Snaith, University of Oxford. Prior to his current position, he completed his PhD of Chemical Engineering and Applied Chemistry in 2016 from the University of Toronto. Currently, his core contribution focuses on the creation of highly efficient white LEDs with high brightness combined with operational durability. He examines a wide range of different highly emissive and stable perovskite NCs (2D and 3D) emitters, with controlled size and surface structure, which have the desirable emission band gap to cover the whole panchromatic absorption profile with the focus on their optoelectronic applications.

yasser.hassan@physics.ox.ac.uk

Notes: