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Enhanced emission intensity and stability of perovskite nanocrystals by using metal organic frameworks

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Perovskite semiconductor nanocrystals (PNCs) have appeared as a new kind of excellent optoelectronic materials for photovoltaic applications due to their remarkable optical properties [1]. Although PNCs have many significant properties, they still have problems such as poor stability. The structure of PNCs will be damaged when exposed to the environment of humidity, polar solvents or high temperature and metal−organic frameworks (MOFs) can be used to solve this problem [2]. This porous crystalline materials, possess numerous advantages including unique chemical functions (absorption/ catalyst), useful physical properties (luminescent/ magnetic), high surface area, tunable porosity, structural diversity and different coordination geometries [3]. This work reports, a facile strategy to improve the stability and photoluminescence of novel PNCs by encapsulating them in UiO-67 was introduced. UiO-67 is a type of MOFs that was synthesized using $ZrCl_4$ and 4,4-biphenyldicarboxylic acid (H_2BPDC) using a hydrothermal method. In the present study, novel synthesized PNCs using the ligand-assisted reprecipitation technique (LARP) method. The PNCs@Uio-67 composite shows higher photoluminescence intensity and better stability compared to bare PNCs. The resulted composite powder exhibited good deep blue-luminescence (λ_{exc} = 320 nm), high PLQY (~58%), excellent thermal stability and long-term storage stability.

Keywords: Perovskite semiconductor nanocrystals (PNCs), UiO-67, PNCs@Uio-67 composite

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