P57

Effect of surface ligands on fluorescence properties and stability of all-inorganic $CsPbI_3$ perovskite quantum dots

S. Kou, M. Wang, Zh. Yang

Electronic Materials Research Laboratory, Key Laboratory of the Ministry of Education International Center for Dielectric Research & Shaanxi Engineering Research Center of Advanced Energy Materials and Devices, Xi'an Jiaotong University, Xi'an 710049, China
mqwang@mail.xjtu.edu.cn

In recent years, with the rapid increase in the external quantum efficiency of perovskite LED luminescence, the perovskite materials and the device has attracted the attention of researchers from all over the world, and it has become a new research hotspot in the field of display materials and devices. Although the research on perovskite LED devices has made great progress, the stability of the device cannot meet the requirements of industrialization. Therefore, the challenge is to further improve device performance and seek technological breakthroughs to achieve long device lifetimes.

The design of new thermal injection schemes includes injection temperature, organic solvent, precursor species, optimization of synthesis process conditions from the perspective of synthesis methods, which will be improvement of quantum yield and luminescence stability of quantum dots. The surface modification of $CsPbI_3$ quantum dots was studied. The multi-ligand strategy was used to study the effects of ligand types and addition amounts on quantum dot dispersion stability and fluorescence quantum yield. The surface doping of $CsPbI_3$ quantum dots is studied for the influence of element type, doping amount and quantum dot size on the phase stability of $CsPbI_3$ quantum dots. Perovskite materials with different fluorescence bands were prepared, and their microstructure, fluorescence spectra and fluorescence quantum yield were characterized by SEM and steady-state transient fluorescence spectrometer. The $CsPbI_3$ quantum dots have an average grain size of 10-20 nm, a size distribution of less than 5%, a fluorescence emission wavelength of 450-700 nm, a fluorescence peak half-height width of less than 30 nm, and a fluorescence lifetime of more than 50 ns. The solution fluorescence quantum yield is higher than 95%, and the solution is stored in a closed container for more than one month.