ET-P005

Efficiency enhancement of spray QD solar cells

Dasom Park, Wonseok Lee, Jinwoong Jang, Sanggyu Yim*

Department of Chemistry, Kookmin University, Seoul 136-702, South Korea

Colloidal quantum dot (CQD) is emerging as a promising active material for next-generation solar cell applications because of its inexpensive and solution-processable characteristics as well as unique properties such as a tunable band-gap due to the quantum-size effect and multiple exciton generation. However, the most widely used spin-coating method for the formation of the quantum dot (QD) active layers is generally hard to be adopted for high productivity and large-area process. Instead, the spray-coating technique may potentially be utilized for high-throughput production of the CQD solar cells (CQDSCs) because it can be adapted to continuous process and large-area deposition on various substrates although the cell efficiency is still lower than that of the devices fabricated with spin-coating method. In this work, we observed that the subsequent treatment of two different ligands, halide ion and butanedithiol, on the lead sulfide (PbS) QD layer significantly enhanced the cell efficiency of the spray CQDSCs. The maximum power conversion efficiency was 5.3%, comparable to that of the spin-coating CQDSCs.

Keywords: spray solar cell, quantum dot, QD

ET-P006

Synthesis and Characterization of Upconversion Nanoparticles for Cancer Therapy

최승유[1], 김보배[2], 김은비[2], 이승우[2], 전선아[2], 박태정*

중앙대학교 화학과 나노바이오화학연구실

Various fields have been paid attention to upconversion nanoparticles (UCNPs) because of its unique optical properties. Moreover, to use the UC luminescent techniques through cell images for identified apoptosis/necrosis of cancer cells have been performed. They have been studied for a versatile biomedical application such as a biosensing tool, or delivery of active forms of medicines inside living cells. UCNPs have distinctive characteristics such as photoluminescence, special emission, low background fluorescence signal and good colloidal stability, which have many advantages compared with the organic dyes and quantum dots. UCNPs have not only a great potential for imaging (UC luminescence) but also therapies (photo-thermal therapy, PTT and photo-dynamic therapy, PDT) in cancer diagnostics. Therefore, we report the enhancement of upconversion red emission in NaYF4:Yb3+,Er3+ nanoparticles, synthesized via solid-state method with the thermal decomposition of trifluoroacetate as precursors and organic solvent at a high boiling point. The UCNPs have an emission in the field of near infrared wavelength, cubic shape and nano-size in length. In this study, we will further investigate it for cancer therapy with NIR optical detection onto the solid substrate.

Keywords: Photoluminescence, Upconversion nanoparticle, NIR detection