

Characterization of self-quench-resistant carbon dots and their application to white light-emitting-diodes

유효정, 곽병은, 김도현[†]
한국과학기술원
(dohyun.kim@kaist.edu[†])

Carbon dot (CD), fluorescent carbon nanomaterial, has emerged as a promising phosphor due to its strong fluorescence, low toxicity, easy preparation, and low photo-bleaching. However, self-quenching problem of CD in solid-state hinders its application to opto-electric devices which strongly demand solid-state phosphors. Here, we synthesized CD using citric acid and urea by microwave-assisted method. The prepared CD showed photoluminescence (PL) both in solution- and solid-state. In solution-state, the CD exhibited blue emission with the wavelength of 433 nm, while it showed yellow emission at 535 nm in solid-state under 360 nm excitation. We characterized the spectroscopic properties of the CDs with PL excitation and PL lifetime measurement to investigate the correlation between its emission properties and structural features. Also, we fabricated white LED using blue-LED chip and the prepared CD as yellow phosphor. Our work will open the avenue to expand the application of CD in various fields requiring solid-state phosphors.