

Synthesis of blue-emitting carbon dot with luminescence quenching-resistance in solid-state

곽병은, 유효정, 김도현[†]

KAIST

(dohyun.kim@kaist.ac.kr[†])

Carbon dot (CD) is a new type of carbon material with advantages such as intense luminescence, simple preparation, and low toxicity. However, most CD shows aggregation-caused luminescence quenching in solid-state. For the practical applications, CD showing luminescence in solid-state should be required. We synthesized self-quenching-resistant CD using citric acid (CA) and diethylenetriamine (DETA) by hydrothermal reaction. Prepared CD exhibited intense blue emission in water with an absolute quantum yield of 74%. In solid-state, our CD was not quenched showing the same blue fluorescence. Structural analysis revealed that as-prepared CD had amorphous structure composed of crosslinking between CA and DETA. This polymeric network may suppress the aggregation of fluorophores and the interaction between them, which leads to solid-state luminescence. We also fabricated CD-based LED, and the LED showed blue emission with a luminous efficacy of 13.1 lm/W.