

Chemical origin of photoluminescence from graphite-derived carbon dots

박윤상, 권우성^{1,†}

포항공과대학교; ¹숙명여자대학교

(wkwon@sm.ac.kr[†])

Optically active carbon dots (CDs) attract much attention recently as biocompatible and sustainable photoluminescent nanoparticles for a variety of applications. However, poor understanding of the microscopic origin of their photoluminescence (PL) hinders attempts toward energy modification and limits their practical use. Here, we investigate the chemical origin of the PL of graphite-derived CDs (gCDs) by manipulating their chemical structures via reduction and deprotonation. Using a combination of femtosecond transient absorption spectroscopy and time-correlated single photon counting measurement, we elucidate the PL excitation mechanism and establish the roles of functional groups and carbon cores in activation of the energy states responsible for the visible and near-infrared PL bands. Finally, we demonstrate freestanding luminescent hydrogels employing our gCDs which could serve as a versatile biocompatible phosphor.