Visible to near-infrared photoluminescence of graphite-derived carbon dots

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Carbon dots (CDs) have unique photoluminescence (PL) properties due to their surface functional groups and carbon core. However, controlling their PL is still challenging due to their unclear chemical origin of PL from CDs. Here, we engineered chemical structure of graphite-derived CDs (gCDs) via reduction and deprotonation. The chemical changes and PL changes from these chemical manipulations are deeply investigated. In combination of femtosecond transient absorption spectroscopy and time-correlated single photon counting measurement, we investigate the chemical origin of visible and near-infrared photoluminescence (PL) of gCDs and propose the emission mechanism. Finally, we demonstrate the freestanding luminescent hydrogels employing our chemically modified g-CDs as a biocompatible phosphor.