One step synthesis of fluorescent Carbon Dots through pyrolysis of N-hydroxysuccinimide

Corneliu S. Stan*[1], Cristina Albu[1], Adina Coroaba[2], Marcel Popa[1], Daniel Sutiman[1]

1. Faculty of Chemical Engineering and Environmental Protection, Gh. Asachi Technical University, D. Mangeron 73 Ave., 700050, Iasi, Romania
2. Centre of Advanced Research in Bionanoconjugates and Biopolymers, "Petru Poni" Institute of Macromolecular Chemistry of Romanian Academy Grigore Ghica Voda 41A Alley, 700487 Iasi, Romania

Abstract: In this work, fluorescent Carbon Dots were prepared through a simple, straightforward, one step pyrolytic processing of N-Hydroxysuccinimide. The prepared C-Dots present remarkable photoluminescence with blue to green shifting emission and absolute quantum yields varying from 14 to 31%, depending on the excitation wavelength and selected dispersion mediums. Interestingly, upconversion from NIR to visible range was instrumentally recorded, the process being even visually observable. Further, the composition and morphology of the prepared C-Dots were studied using XPS, FT-IR, Raman, P-XRD, DLS and AFM investigation methods. While the majority of C-Dots studies are biased towards fluorescent labeling in cellular imaging, their photoluminescence properties, physicochemical stability and ease of fabrication are expected to play a key role in applications ranging from sensors to efficient solar energy conversion or high performance optoelectronic devices.

Graphical Abstract