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Multifunctional carbon dots originated from waste garlic peel for rapid sensing of heavy metals and fluorescent imaging of 2D and 3D spheroids cultured fibroblast cells

Prakash Krishnaiah^{a,1}, Raji Atchudan^{b,c,1,*}, Suguna Perumal^{d,1}, Prakash Gangadaran^{e,f,1}, Devaraj Manoj^{g,h,1}, Byeong-Cheol Ahn^{e,f}, Raju Suresh Kumarⁱ, Abdulrahman I. Almansourⁱ, Yong Rok Lee^{b,*}, Byong-Hun Jeon^{a,*}

^a Department of Earth Resources and Environmental Engineering, Hanyang University, 222, Wangsimni-ro, Seongdong-gu, Seoul 04763, South Korea

^b School of Chemical Engineering, Yeungnam University, Gyeongsan 38541, Republic of Korea

^c Department of Chemistry, Saveetha School of Engineering, Saveetha Institute of Medical and Technical Sciences, Chennai 602105, Tamil Nadu, India

^d Department of Chemistry, Sejong University, Seoul 143-747, Republic of Korea

^e BK21 FOUR KNU Convergence Educational Program of Biomedical Sciences for Creative Future Talents, Department of Biomedical Science, School of Medicine, Kyungpook National University, Daegu 41944, Republic of Korea

^f Department of Nuclear Medicine, School of Medicine, Kyungpook National University, Kyungpook National University Hospital, Daegu 41944, Republic of Korea

^g Department of Chemistry, Karpagam Academy of Higher Education, Coimbatore 641021, Tamil Nadu, India

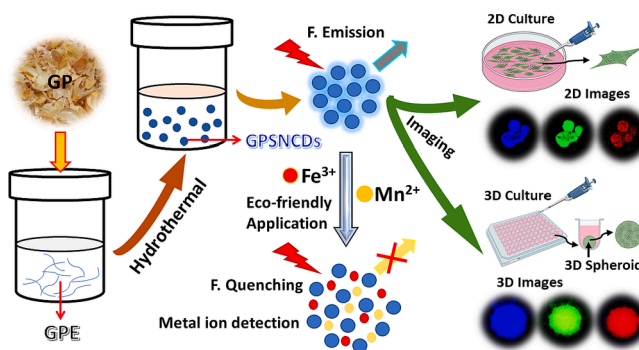
^h Centre for Material Chemistry, Karpagam Academy of Higher Education, Coimbatore 641021, Tamil Nadu, India

ⁱ Department of Chemistry, College of Science, King Saud University, Riyadh 11451, Saudi Arabia

HIGHLIGHTS

- Sulfur and nitrogen self-doped carbon dots were prepared hydrothermally from waste garlic peel.
- The as-prepared GPSNCDs emit strong fluorescence without capping and passivation.
- The GPSNCDs were highly sensitive to Fe^{3+} and Mn^{2+} with lower detection limits of 0.75 and 0.95 μM , respectively.
- The novel fluorescent GPSNCDs can be used as high-performance sensors for environmental monitoring.
- The GPSNCDs can be applied to imaging normal fibroblast cells without further modifications.

GRAPHICAL ABSTRACT



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ABSTRACT

Here, we prepared sulfur and nitrogen self-doped carbon dots derived from garlic peel extract (GPSNCDs) using a hydrothermal method. The as-synthesized GPSNCDs were confirmed using Fourier-transform infrared spectroscopy, X-ray diffraction, X-ray photoelectron spectroscopy, and transmission electron microscopy. The analytical techniques indicate that the resulting GPSNCDs exhibit distinct emissive carbon-core with

* Corresponding authors.

E-mail addresses: atchudanr@yu.ac.kr (R. Atchudan), yrlee@yu.ac.kr (Y.R. Lee), bhjeon@hanyang.ac.kr (B.-H. Jeon).

¹ These authors have contributed equally to this work.

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