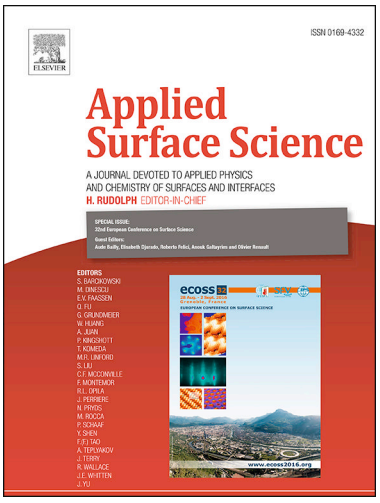

Full Length Article

Highly fluorescent carbon dots from enokitake mushroom as multi-faceted optical nanomaterials for Cr^{6+} and VOC detection and imaging applications

Melvin R. Pacquiao, Mark Daniel G. de Luna, Nichaphat Thongsai, Sumana Kladsomboon, Peerasak Paoprasert

PII: S0169-4332(18)31172-3
DOI: https://doi.org/10.1016/j.apsusc.2018.04.199
Reference: APSUSC 39198

To appear in: *Applied Surface Science*

Received Date: 24 February 2018
Revised Date: 19 April 2018
Accepted Date: 22 April 2018

Please cite this article as: M.R. Pacquiao, M.D.G. de Luna, N. Thongsai, S. Kladsomboon, P. Paoprasert, Highly fluorescent carbon dots from enokitake mushroom as multi-faceted optical nanomaterials for Cr^{6+} and VOC detection and imaging applications, *Applied Surface Science* (2018), doi: https://doi.org/10.1016/j.apsusc.2018.04.199

Highly fluorescent carbon dots from enokitake mushroom as multi-faceted optical nanomaterials for Cr^{6+} and VOC detection and imaging applications

Melvin R. Pacquiao[a], Mark Daniel G. de Luna[a,b], Nichaphat Thongsai[c], Sumana Kladsomboon[d], Peerasak Paoprasert[c*]

[a]National Graduate School of Engineering, University of the Philippines Diliman, 1101 Quezon City, Philippines

[b]Department of Chemical Engineering, University of the Philippines, Diliman, 1101 Quezon City, Philippines

[c]Division of Chemistry, Faculty of Science and Technology, Thammasat University, Pathumthani,12120 Thailand

[d]Department of Radiological Technology, Faculty of Medical Technology, Mahidol University, Nakhon Pathom, 73170 Thailand

*Corresponding author, email: peerasak@tu.ac.th

ABSTRACT

Carbon dots are optically unique materials for sensing applications that can be prepared from various raw natural materials. In this work, highly fluorescent carbon dots were synthesized from enokitake mushroom via a one-step hydrothermal method in the presence of diluted sulfuric acid. The spherical carbon dots, with an average diameter of 4 nm, exhibited blue photoluminescence under UV illumination and a quantum yield of 11%, increasing to 39% upon passivation with tetraethylenepentamine. We employed both photoluminescence and light absorption properties of carbon dots for Cr^{6+} and volatile organic compound (VOC) sensing. Their fluorescence emission was selectively quenched by Cr^{6+} with a limit of detection of 0.73 µM. A fluorescent colorimetric paper-based device was fabricated and demonstrated to