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Facile preparation of highly luminescent composites by polymer embedding of carbon dots derived from *N*-hydroxyphthalimide

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ABSTRACT

Highly luminescent composites were prepared through embedding newly developed carbon dots (C-Dots) derived from *N*-hydroxyphthalimide in PS, PVC and PC polymer matrices. *N*-hydroxyphthalimide was found to be an excellent precursor for obtaining C-Dots through a simple pyrolytic process. The C-Dots prepared by the described method are highly luminescent with an absolute quantum yield of 79.95 % which is among the highest values reported up to date. The resulted composites preserve the remarkable photoluminescent properties of the embedded C-Dots. The composites were processed in thin films or various shaped monoliths. Prior to embedment, the composition and morphology of the prepared C-Dots were investigated by XPS, FT-IR, P-XRD, DLS TEM and fluorescence spectroscopy whereas the prepared composites were investigated by AFM. Due to their truly remarkable photoluminescent properties and facile fabrication, the prepared C-Dots and related composites could be of interest for applications ranging from sensors to solar energy conversion and light-emitting devices. As will be described later, one suggested straightforward application is the UV protection of various sensitive surfaces provided by thin layers of prepared composites.

Introduction

Carbon dots with their tunable photoluminescence (PL) located in the lower-mid region of the visible spectrum, chemical inertness, lack of toxicity and facile preparation [1] should provide an interesting starting point for applications ranging from opto-electronics, sensors to new formulations of assays for bioimaging. Despite their most interesting feature, the excitation wavelength-dependent PL emission, the mechanism underneath this behaviour is still a

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