

Author's Accepted Manuscript

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PII: S0039-9140(16)30032-7
DOI: <http://dx.doi.org/10.1016/j.talanta.2016.01.029>
Reference: TAL16281

To appear in: *Talanta*

Received date: 13 November 2015
Revised date: 12 January 2016
Accepted date: 14 January 2016

Cite this article as: A. Cayuela, M.L. Soriano, S.R. Kennedy, J.W. Steed and M. Valcárcel, Fluorescent carbon quantum dot hydrogels for direct determination of silver ions, *Talanta*, <http://dx.doi.org/10.1016/j.talanta.2016.01.029>

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Fluorescent carbon quantum dot hydrogels for direct determination of silver ions

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ABSTRACT

The paper reports for the first time the direct determination of silver ion (Ag^+) using luminescent Carbon Quantum Dot hydrogels (CQDGs). Carbon Quantum Dots (CQDs) with different superficial moieties (*passivate*-CQDs with carboxylic groups, *thiol*-CQDs and *amine*-CQDs) were used to prepare hybrid gels using a low molecular weight hydrogelator (LMWG). The use of the gels results in considerable fluorescence enhancement and also markedly influences selectivity. The most selective CQDG system for Ag^+ ion detection proved to be those containing carboxylic groups onto their surface. The selectivity towards Ag^+ ions is possibly due to its flexible coordination sphere compared with other metal ions. This fluorescent sensing platform is based on the strong Ag-O interaction which can quench the photoluminescence of *passivate*-CQDs (*p*-CQDs) through charge transfer. The limit of detection (LOD) and quantification (LOQ) of the proposed method were 0.55 and 1.83 $\mu\text{g}\cdot\text{mL}^{-1}$, respectively, being applied in river water samples.

KEYWORDS: Carbon quantum dots, silver, sensor, supramolecular gel, urea, fluorescence

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