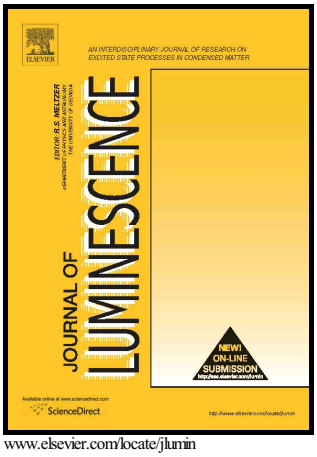

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Mohammad Amjadi, Jamshid L. Manzoori, Tooba Hallaj, Neda Azizi

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Sulfur and nitrogen co-doped carbon quantum dots as the chemiluminescence probe for detection of Cu^{2+} ions

Mohammad Amjadi*, Jamshid L. Manzoori, Tooba Hallaj, Neda Azizi

Department of Analytical Chemistry, Faculty of Chemistry, University of Tabriz, Tabriz 5166616471, Iran

* Corresponding author

Email: amjadi@tabrizu.ac.ir

Tel: +984133393109; Fax: +984133340191

Abstract

Herein, we investigated the direct chemiluminescence (CL) of sulfur and nitrogen co-doped carbon quantum dots (S,N-CQDs) induced by some common oxidants. The results showed that $KMnO_4$ can produce much more intensive CL than other oxidants. The mechanism of the CL reaction was proposed based on the UV-Vis, fluorescence and CL emission spectra. Moreover, the effect of some metal ions on the S,N-CQDs–$KMnO_4$ CL system was studied and found that the CL intensity of this system was significantly declined by Cu^{2+} ions. Based on this effect, a simple and selective CL sensor was established for the detection of trace amount of Cu^{2+} in the concentration range of 0.01 – 0.5 mg L^{-1} with a limit of detection (3s) of 2.1 µg L^{-1}. The method was exploited for the determination of Cu^{2+} in human plasma and water samples with satisfactory results.

Keyword: Sulfur and nitrogen co-doped carbon quantum dots; Carbon nanomaterial; Chemiluminescence; Copper.