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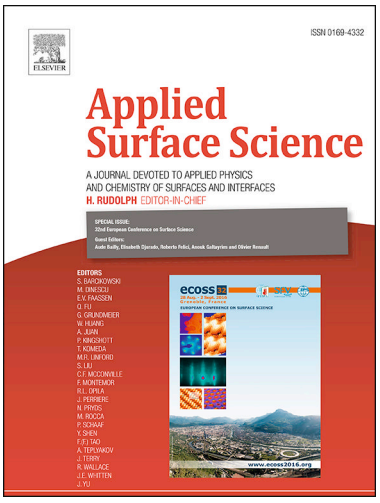

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Green Synthesis of High Photoluminescence Nitrogen-doped Carbon Quantum Dots from Grass via a Simple Hydrothermal Method for Removing Organic and Inorganic Water Pollutions

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Highlights

Novelty of this work is green synthesis of high yield and high photoluminsence of nitrogen doped carbon quantum dots from grass and using them for degradation of six different dyes for the first time. Acid Blue, Acid Red, Eosin Y, Eriochrome Black T, Methyl orange and Methylene blue were six dyes selected for study the photocatalytic activity of the product and it was found it is Visible and Ultraviolet active photocatalyst. Also Cd^{2+} and Pb^{2+} ions were removed from the water by these quantum dots. So it was found the synthesized quantum dots are good candidate for removing both organic and inorganic pollutions from the drinking water.

Abstract

In this work, highly photoluminescence nitrogen-doped carbon quantum dots (N-CQD) were synthesized via a simple hydrothermal method from a very low cost and green material. Different analysis were used to approve synthesis of the quantum dots such as X-ray diffraction pattern (XRD), energy dispersive X-ray analysis (EDAX) and Fourier-transform infrared spectroscopy (FT-IR). The morphology of the product was investigated by scanning electron microscopy (SEM) and transmission electron microscopy (TEM) images. In addition, the surface topography was studied by atomic force microscopy (AFM) and it was found the product has tiny and uniform particles. The photoluminescence (PL) analysis was served to study the photoluminescence intensity and it was found the product has high photoluminescence intensity. To investigate the photocatalytic activity of the product, five dyes namely Acid Blue, Acid Red, Eosin Y, Eriochrome Black T, Methyl orange and Methylene blue were decomposed under