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Synthesis of carbon quantum dots from Broccoli and their ability to detect silver ions

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Abstract

Carbon quantum dots (CQDs) are promising nanomaterials with various industrial applications, including metal ion detection. Herein, a simple, green, and low-cost strategy was developed for the synthesis of fluorescent water-soluble CQDs for selective detection of Ag^+ via one-step hydrothermal treatment of edible green plant, Broccoli. The functional group composition, morphology, and pH stability of the synthesized CQDs were investigated. In this study, the silver ions quenched the PL of the CQDs more strongly than other heavy metals, with a limit of detection (LOD) of $0.5\mu\text{M}$, which indicates that the synthesized CQDs can be effectively used as an Ag^+ sensing tool.

Keywords: Carbon quantum dots; Broccoli; Environment; Heavy metal; Silver ion detection.

1. Introduction

Silver (Ag^+) is one of the most hazardous and universal contaminants, with severe impact on the aquatic environment and human health [1]. Therefore, detection of Ag^+ has become an important task and attempts have been made with various analytical approaches. But most of

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