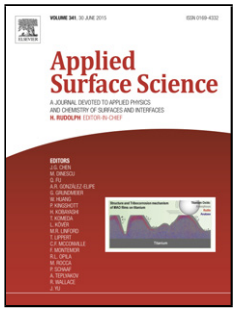

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Preparation of carbon quantum dots with a high quantum yield and the application in labeling bovine serum albumin

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Abstract: An economic and green approach of manufacturing carbon quantum dots (CQDs) with a high quantum yield (denoted with HQY-CQDs) and the application in labeling bovine serum albumin (BSA) were described in detail in this work. Firstly, the cheap resources of citric acid and glycine were pyrolysed in drying oven for preparing the CQDs. Then the product was immersed in tetrahydrofuran for 8 h. HQY-CQDs were obtained by removing tetrahydrofuran from the supernate and were evaluated that they possessed a much higher quantum yield compared with that without dealing with tetrahydrofuran and a wonderful photo-bleaching resistance. Such HQY-CQDs could be functionalized by N-hydroxysuccinimide and successively combined with BSA covalently. Thus fluorescent labeling on BSA was realized. The HQY-CQDs were demonstrated with transmission electron microscopy and the chemical modification with N-hydroxysuccinimide was proved by infrared and X-ray photoelectron spectra. Labeling BSA with the HQY-CQDs was confirmed by gel electrophoresis and fluorescence imaging.

Keywords: Carbon quantum dots; High fluorescence quantum yield; Functionalization with N-hydroxysuccinimide; fluorescent labeling.

Highlights:

1. A cheap carbon quantum dots (CQDs) with a high quantum yield was prepared.
2. The preparation process and surface functionalization on CQDs are rather facile.
3. Such functionalized CQDs can be attached to BSA covalently.