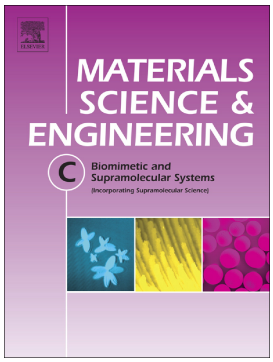

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Cholesterol derived carbon quantum dots as fluorescence probe for the specific detection of hemoglobin in diluted human blood samples

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Abstract

In the current decade, carbon quantum dots (CQDs) are promising fluorescence probe in bio/analytical chemistry due to its unique properties. The functional groups of CQDs can be tuning the optical properties and selectively make a strong bond with target molecules. The interactions between Hb and cholesterol through hydrophobic batches are more favorable than the usual π-π interaction between CQDs and Hb. Hence we prepared highly stable CQDs with a fluorescence quantum yield of 45 % from cholesterol by the hydrothermal method to make hydrophobic interactions with Hb. Concurrently the CQDs possess graphitic crystalline and amphiphilic structure in nature. The fluorescence at 440 nm arises from the intrinsic core of CQDs and it will not affect by solution pH and excitation wavelengths. This fluorescence intensity was selectively quenched by Hb owing to the formation of fluorescence inactive complex (CQDs-Hb) through strong hydrophobic interactions. The quenching mechanism complies with the Forster non-radiative energy transfer (FRET) theory. This method shows good linearity from 0.1 μM to 2.9 μM with a limit of detection of 24 nM (S/N = 3). This observation is used for the quenchometric determination of Hb in diluted human blood samples.