Application of thermally derived merino wool carbon quantum dots for the detection Hg^{2+} in aqueous medium

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A facile, simple and low-cost approach for synthesizing highly fluorescent carbon quantum dots (CQDs) is reported. Wool consists of amino acids linked together by peptide linkages is abundant in C, N, H, O and S. Due to the presence of N containing chemical compounds can be used to synthesize CQD with relatively high quantum yield. Carbon quantum dots (CQDs), as an emerging type of fluorescent nanomaterial, have drawn the attention in recent years due to their unique properties, such as low-cost, easy synthesis, good water dispersibility, stable fluorescence, low toxicity and biocompatibility. Herein, we report a novel and simple approach for synthesizing highly fluorescent CQDs by a one-step thermal treatment of merino wool fibers. The as-prepared CQDs with a quantum yield (QY) of 30 % showed excitation-dependent emission behavior, excellent photo stability and high stability in high salt conditions. We have studied the application of CQDs as nanosensors for metal ions. The CQDs can be utilized to detect Hg^{2+} with good selectivity and sensitivity via Hg^{2+} induced fluorescence quenching mechanism. TEM and AFM analysis showed the prepared CQD are in the size range of 7-9 nm. The derived CQDs are rich in nitrogen and oxygen with hydroxyl, carboxyl and amine groups.

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