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A highly sensitive and selective detection of Cr(VI) and ascorbic acid based on nitrogen-doped carbon dots

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Abstract

A highly sensitive and selective detection of hexavalent chromium (Cr(VI)) and ascorbic acid (AA) was proposed using nitrogen-doped carbon dots (N-CDs). In the absence of AA, the quantitative detection of Cr(VI) was realized through Cr(VI) acting as a quencher to quench the fluorescence of N-CDs by inner filter effect (IFE) and static quenching effect. Under the optimal conditions, the linear range for Cr(VI) detection was from 0.01 to 250 μM with a detection limit of 5 nM (S/N=3). In the presence of AA, the fluorescence intensity could be rapidly enhanced compared with the fluorescence of N-CDs/Cr(VI) system since Cr(VI) can be reduced into trivalent chromium (Cr(III)) by AA. And a wide linear range for AA detection was obtained from 1 to 750 μM. The detection limit was 0.3 μM (S/N=3). More importantly, this method can be successfully applied to the detection of Cr(VI) in real water samples,

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