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A novel turn-on fluorescent strategy for sensing ascorbic acid using graphene quantum dots as fluorescent probe

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Abstract

In this paper, a facile and rapid fluorescence turn-on assay for fluorescent detection of ascorbic acid (AA) was developed by using the orange emission graphene quantum dots (GQDs). In the presence of horse radish peroxidase (HRP) and hydrogen peroxide (H_2O_2), catechol can be oxidized by hydroxyl radicals and converted to o-benzoquinone, which can significantly quench the fluorescence of GQDs. However, when AA present in the system, it can consume part of H_2O_2 and hydroxyl radicals to inhibit the generation of o-benzoquinone, resulting in fluorescence recovery. Under the optimized experimental conditions, the fluorescence intensity was linearly correlated with the concentration of H_2O_2 in the range of 3.33-500 μM with a detection limit of 1.2 μM . The linear detection for AA was in the range from 1.11 μM to 300 μM with a detection limit of 0.32 μM . The proposed method was applied to the determination of AA in human serum samples with satisfactory results.

Key words: Ascorbic acid, H_2O_2 , Graphene quantum dots (GQDs), Catechol, O-benzoquinone

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