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Fluorescence Turn-off-on probe based on polypyrrole/graphene quantum composites for selective and sensitive detection of paracetamol and ascorbic acid

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#### Abstract

In this work, we presented a novel biosensor for rapid detection of paracetamol and ascorbic acid. The novel biosensor was based on the fluorescent “turn off-on” of polypyrrole/graphene quantum dots (PPy/GQDs) composites. The composites exhibit strong fluorescence emission, which is dramatically enhanced as high as three times than that of pure GQDs. It is found that the fluorescence intensity of PPy/GQDs can be efficiently quenched by N-acetyl-p-benzoquinone (4-AOBQ), the oxidation product of paracetamol (PAR). And a turn-on fluorescence signal was observed when 4-AOBQ is reduced by ascorbic acid (AA). The quenched and recovered fluorescence intensity of PPy-GQDs was proportional to the concentration of PAR (0.067-233  $\mu\text{g/L}$ ) and AA (3.33-997.5  $\mu\text{g/L}$ ) respectively. The limit of detection is 0.022  $\mu\text{g/L}$  for PAR and 1.05  $\mu\text{g/L}$  for AA. The present method was applied to the determination of PAR and AA in human serum samples with satisfactory results.

Keywords: graphene quantum dots; polypyrrole; fluorescence; paracetamol; ascorbic acid

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