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**Protic Ionic liquids as a versatile modulator and stabilizer in regulating artificial peroxidase activity of carbon materials for glucose colorimetric sensing**

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**Abstract**

Herein, by utilizing ionic liquid, we have shown for the first time that activated carbon can be used as a cheap and recyclable peroxidase mimic in the construction of colorimetric sensors for biomedical applications. The proposed nanozyme catalyzed the oxidation of 3,3',5,5'-tetramethylbenzidine (TMB) in the presence of hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>) to produce a blue colored product which can be monitored at 652 nm. H<sub>2</sub>O<sub>2</sub> is the oxidative product of glucose in the presence of glucose oxidase. Therefore, the oxidation of glucose can be quantitatively related to the colorimetric response by combining these two reactions. Under the optimal experimental conditions, a linear response was observed for glucose concentrations ranging from 12 to 550 μmol/L, with a detection limit of 3.5 μmol/L. Furthermore, the specificity of the proposed method was demonstrated against common interfering compounds including uric acid, ascorbic acid, lactose, sucrose and maltose. The applicability of the proposed method was demonstrated for glucose detection in human serum samples. The proposed methodology can serve as a general way to design ionic liquid based nanozyme mimetics for various catalytic reactions and colorimetric sensing applications.

**Keywords:** Activated Carbon; protic ionic liquids; artificial enzyme modulator and stabilizer; colorimetric sensor; glucose detections, Serum sample

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