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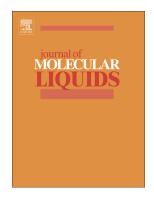
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Protic Ionic liquids as a versatile modulator and stabilizer in regulating artificial peroxidase activity of carbon materials for glucose colorimetric sensing

Sajid Rauf^{a,b}, Muhammad Azhar Hayat Nawaz^a, Nawshad Muhammad^a, Rizwan Raza^b, Shakir Ahmad Shahid^c, Jean Louis Marty^d, Akhtar Hayat^a*

^aInterdisciplinary Research centre in Biomedical Materials (IRCBM), COMSATS Institute of Information technology, Lahore, Pakistan

^bDepartment of Physics, COMSATS Institute of Information technology, Lahore, Pakistan

^cDepartment of Chemistry, University of Sargodha, Sargodha 40100, Pakistan

^dBAE: Biocapteurs-Analyses-Environnement, Universite de Perpignan Via Domitia, 52 Avenue Paul Alduy, Perpignan Cedex 66860, France

*Corresponding author; akhtarhayat@ciitlahore.edu.pk

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 purposed nanozyme catalyzed the oxidation of 3,3',5,5'-tetramethylbenzidine (TMB) in the presence of hydrogen peroxide (H_2O_2) to produce a blue colored product which can be monitored at 652 nm. H_2O_2 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 μ mol/L, with a detection limit of 3.5 μ mol/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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