Colorimetric detection of hydrogen peroxide and glucose based on MnFe2O4 – graphitic carbon nitride nanocomposites with intrinsic peroxidase-like activity

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In this study, manganese ferrite oxide – graphitic carbon nitride (MnFe2O4/g-C3N4) nanostructure is facile fabricated by hydrothermal method at 200 oC. The as-synthesized MnFe2O4/g-C3N4 nanocomposites used as an effective peroxidase mimics to catalyze the oxidation of the substrate 3,3′,5,5′-tetramethylbenzidine (TMB) in the presence of H2O2 to produce a blue-colored solution with a maximum absorbance at 652 nm. Investigations on the kinetics indicate that the MnFe2O4/g-C3N4 catalytic behavior follows Michaelis-Menten kinetics and a ping-pong mechanism. The calculated kinetic parameters show the high affinity of composite for both the substrate TMB and H2O2, which are better than other peroxidase mimicking nanomaterials and even the natural enzyme horseradish peroxidase. Moreover, by cooperated with glucose oxidase, this developed assay can detect glucose with a linear range of 1□M to 2 mM glucose concentration with no significant interference species. It is expected that MnFe2O4/g-C3N4 become a great potential material to be a powerful tool for the detection of glucose in the future.