

Enhanced peroxidase-like activity of graphene oxide-based nanohybrid material for use in immunoassay

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We have developed a new synergistically integrated nanohybrid consisting of Fe₃O₄ magnetic nanoparticles (MNPs) and platinum nanoparticles (Pt NPs), simultaneously immobilized on the surface of graphene oxide (GO). And we have formed antibody-conjugated nanohybrids, which are expected to efficiently bind target cancer cells. Application of H₂O₂ and the selected peroxidase substrate, 3,3', 5,5'-tetramethylbenzidine (TMB) to the nanohybrid then promotes oxidation of TMB to generate a blue product. The constructed nanohybrid displayed up to 30 times higher maximal reaction velocity (V_{max}) compared to that of free GO, and enabled rapid detection of target cancer cells. Specifically, using this new assay system, we were able to detect clinically important breast cancer cells in only 5 min at room temperature with high specificity and sensitivity.