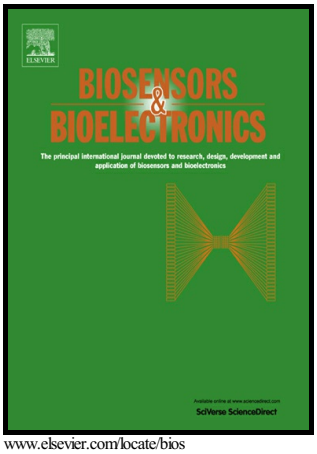

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Abstract

Ultrasensitive mediator-free electrochemical detection for biomarker proteins was achieved at low cost using a novel composite of Fe_3O_4 nanoparticles loaded onto graphene oxide (GO) nano-sheets (Fe_3O_4@GO). This paramagnetic Fe_3O_4@GO composite (1 μm size range) was decorated with. antibodies against prostate specific antigen (PSA) and prostate specific membrane antigen (PSMA), and then used to first capture these biomarkers and then deliver them to an 8-sensor detection chamber of a microfluidic immunoarray. Screen-printed carbon sensors coated with electrochemically reduced graphene oxide (ERGO) and a second set of antibodies selectively capture the biomarker-laden Fe_3O_4@GO particles, which subsequently catalyze hydrogen peroxide reduction