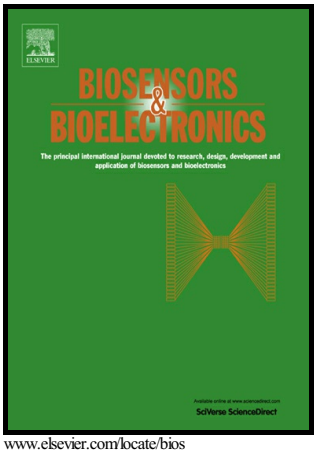

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Efficient label-free chemiluminescent immunosensor based on dual functional cupric oxide nanorods as peroxidase mimics

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Abstract: Dual-functional cupric oxide nanorods (CuONRs) as peroxidase mimics are proposed for the development of a flow-through, label-free chemiluminescent (CL) immunosensor. Forming the basis of this cost-efficient, label-free immunoassay, CuONRs, synthesized using a simple hydrothermal method, were deposited onto epoxy-activated standard glass slides, followed by immobilization of biotinylated capture antibodies through a streptavidin bridge. The CuONRs possess excellent catalytic activity, along with high stability as a solid support. Antigens could then be introduced to the sensing system, forming large immunocomplexes that prevent CL substrate access to the surface, thereby reducing the CL signal in a concentration dependent fashion. Using carcinoembryonic antigen (CEA) as a model analyte, the proposed label-free immunosensor was able to rapidly determine CEA with a wide linear range of 0.1–60 ng mL^{-1} and a low detection limit of 0.05 ng mL^{-1}. This nanozyme-based immunosensor is simple, sensitive, cost-efficient, and has the potential to be a very promising platform for fast and efficient biosensing applications.

Keywords: Dual-functionalization, Cupric oxide nanorods, Immunosensor, Peroxidase mimetics, Chemiluminescence, Carcinoembryonic antigen

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