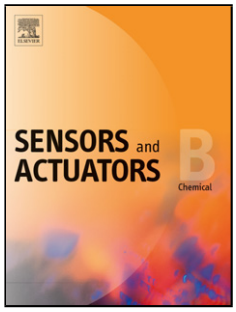

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Cathodic Photoelectrochemical Immunoassay Based on Glucose-Oxidase Mediated Biocatalysis to Inhibit the Exciton Trapping of Cupric Ions for PbS Quantum Dots

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Graphical Abstract

Herein, we induce a novel strategy for the construction of cathodic PEC immunoassay on the basis of enzymatic reaction inhibited exciton trapping for PbS quantum dots (QDs). The cathodic photocurrent of the PbS QDs sensitized NiO was inhibited by cupric ions due to the formation of exciton trapping centers of CuS on their surface. In the presence the model target of carcinoembryonic antigen (CEA), a sandwich-type immunoreaction occurred with the detection antibody labeled glucose oxidase (GOx) as the signal tracer. The enzymatic reduction of ferricyanide ($[Fe(CN)_6]^{3-}$) by GOx produced ferrocyanide, which easily combined with cupric ions to form cupric hexacyanoferrate aggregates, and thus interrupted the formation of the exciton trapping centers of CuS. The developed cathodic PEC immunoassay possessed excellent analytical performances in terms of sensitivity, specificity and reproducibility.