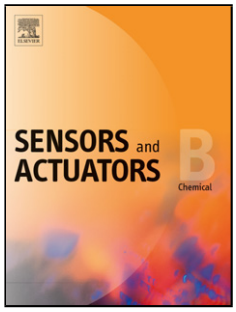


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# $Fe^{3+}$ doped ZnO-Ag photocatalyst for photoelectrochemical sensing platform of ultrasensitive $Hg^{2+}$ detection using exonuclease III-assisted target recycling and DNAzyme-catalyzed amplification

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**Highlights:**

- Visible light photocatalyst of $Fe^{3+}$/ZnO-Ag was prepared by atmospheric selfinduction synthesis method as photoactive materials to modify ITO electrode.
- The low concentration of $Hg^{2+}$ could be detected due to the double amplification of exonuclease III-assisted target recycling and DNAzyme biocatalytic precipitation.

## ABSTRACT

Herein we designed a novel photoelectrochemical sensing platform based on $Fe^{3+}$ doped ZnO-Ag photocatalyst ($Fe^{3+}$/ZnO-Ag) for ultrasensitive $Hg^{2+}$ detection by using exonuclease III-assisted target recycling and DNAzyme-catalyzed amplification. Firstly, $Fe^{3+}$/ZnO-Ag was synthesized to provide photocurrent under visible light irradiation. Secondly, target $Hg^{2+}$ was determined by hairpin DNA probes on the $Fe^{3+}$/ZnO-Ag modified ITO based on T-$Hg^{2+}$-T, and then $Hg^{2+}$ was released by the digestion of exonuclease III to double-stranded DNA. Finally, the photocurrent markedly decreased due to catalysis of hemin/G-quadruplex toward 4-chloro-1-naphthol. Under optimal conditions, the photocurrents were linearly related to $Hg^{2+}$ concentrations form 0. 5 nM to 100 nM with a detection limit of 0. 1