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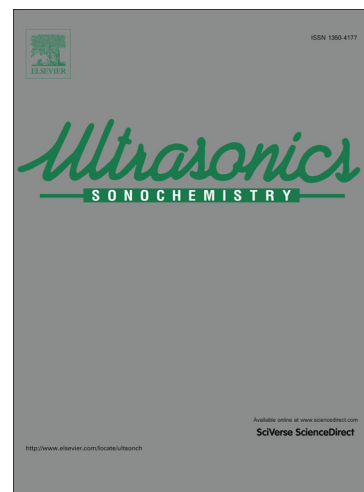
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# Electrospun nanofibers decorated with bio-sonochemically synthesized gold nanoparticles as an ultrasensitive probe in amalgam-based mercury (II) detection system

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## Abstract

In this study, bio-ultrasound-assisted synthesized gold nanoparticles using *Gracilaria canaliculata* algae have been immobilized on a polymeric support and used as a glassy probe chemosensor for detection and rapid removal of  $\text{Hg}^{2+}$  ions. The function of the suggested chemosensor has been explained based on gold-amalgam formation and its catalytic role on the reaction of sodium borohydride and rhodamine B (RhB) with fluorescent and colorimetric sensing function. The catalyzed reduction of RhB by the gold amalgam led to a distinguished color change from red and yellow fluorescence to colorless by converting the amount of  $\text{Hg}^{2+}$  deposited on Au-NPs. The detection limit of the colorimetric and fluorescence assays for  $\text{Hg}^{2+}$  was 2.21 nM and 1.10 nM respectively. By exposing the mentioned colorless solution to air for at least 2 hours, unexpectedly it was observed that the color and fluorescence of RhB were restored. Have the benefit of the above phenomenon a recyclable and portable glass-based sensor has been provided by immobilizing the Au-NPs and RB on the glass slide using electrospinning. Moreover, the introduced combinatorial membrane has facilitated the detection and removal of  $\text{Hg}^{2+}$  ions in various Hg (II)-contaminated real water samples with efficiency of up to 99%.

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