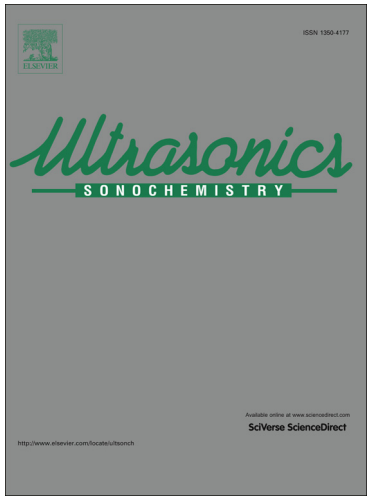

Electrospun nanofibers decorated with bio-sonochemically synthesized gold nanoparticles as an ultrasensitive probe in amalgam-based mercury (II) detection system

Zohreh Parsaee

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

Zohreh Parsaee*

* Young Researchers and Elite Club, Bushehr Branch, Islamic Azad University, Bushehr, Iran

Email address zohreh_parsaee@yahoo.com

Keywords: Ultrasound, Gold NPs, Gracilaria canaliculata, Mercury (II), Electrospinning, Chemosensor.

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 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 florescence to colorless by converting the amount of Hg^{2+} deposited on Au-NPs. The detection limit of the colorimetric and fluorescence assays for 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 Hg^{2+} ions in various Hg (II)-contaminated real water samples with efficiency of up to 99%.