Submission Summary

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Paper Title
Glucose- functionalized gold nanoparticles in Lead detection

Abstract
Heavy metals are inorganic elements with a density of less than 5 g/ cm3, such as Arsenic (As), Cadmium (Cd), Lead (Pb), and Mercury (Hg) [1]. Heavy metals are naturally occurring and can be introduced into the environment through anthropogenic activities such as mining, chemical fertilizers, and burning of fossil fuels. The frequently used techniques for heavy metal analysis include atomic absorption spectroscopy (AAS), atomic fluorescent spectroscopy, and inductively coupled plasma–mass spectrometry (ICP–MS) [2,3,4]. High versatility toward simultaneous metal detection, sensitivity, specificity, accurate detection of metals, and low detection range in the femtomolar range are a few advantages of these methods [5]. However, they show certain drawbacks, such as expensive and sophisticated instruments [6] with the need for multistep sample preparation that requires expertise for accurate results [7]. As a result, the need for rapid, cost-effective, simple, and reliable approaches for in situ and real-time monitoring of heavy metals has increased, prompting the development of sensors [8]. Optical detection identifies optical variations resulting from interactions between the detection components and the analyte. The optical signal will undergo changes due to the interaction between these chemical reagents and varying concentrations of heavy metals, enabling the quantification of each heavy metal through recorded measurements. In the present study we have synthesized the glucose-modified gold nanoparticle to function as an optical sensor for selective detection of Pb in water. The UV- Vis absorption spectra revealed two absorption peaks, one within the range of 500-600 nm specific to AuNPs and the other peak around 700- 800 nm characteristic of AuNP’s aggregation in the presence of Pb. Glucose functionalized AuNPs can be employed in detecting As below its permissible amount.

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