Surfactant functionalized silver nanomaterials as sensors for the detection of mercury in aqueous samples

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Mercury, a worldwide pollutant from natural or anthropogenic sources, can be globally transported and released to the environment.The aim of this study was to develop an analytical method for the determination of mercury in aqueous samples. Most analytical methods reported for the quantification of mercury require complex procedures and expensive equipment, in the work, a simple and sensitive protocol has been developed for the determination of mercury using room temperature synthesized and Brij-35 modified silver nanoparticles. The addition of mercury to nanoparticles followed a linear response and changed the absorbance in two concentration ranges from 0.5 to 2 μ mol L^{-1} and 50 to 200 μ mol L^{-1} with limit of detection (LODs) of 5.5 $x10^{-8}$ and 6.3 x 10^{-6} mol L^{-1} respectively, while the correlation coefficient was approaching unity. The higher concertation from 50 to 150 μ mol L^{-1} also induced spectral shift (blue shift) with LOD of 2.6 $x10^{-7}$ molL^{-1} correlation coefficient of 0.997. The reproducibility of the sensor was accessed by relative standard deviation that was below 10 %. Determination of mercury was successfully made in tape water after spiking with two concentrations and satisfactory recoveries were obtained. The performance of the sensor showed that it can be applied to the determination of mercury in real samples.

Keywords: Mercury; Silver nanoparticles; Standard deviation