Supplementary Information

Selective determination of mercury (II) in coastal water using bio- functionalized gold nanoparticles

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ABSTRACT

The key to simple and rapid detection of a large volume of samples lies in the hands of solution-based nanomaterial sensors. Quantification of mercury in the river and coastal water is analytically challenging due to the potential interference of the matrix. In this endeavor, lysine-capped gold nanoparticles (Lys-AuNPs) based colorimetric sensors are demonstrated here towards efficient detection of trace amounts of mercury ions (Hg^{2+}) in coastal and estuarine water. The colorimetric behavior of Lys-AuNPs is related to surface plasmon resonance (SPR)

During analysis, interestingly a decrease in the intensity of the original SPR peak at 530 nm was observed, with the concomitant appearance of a new peak at a longer wavelength due to agglomerated Lys- AuNPs. Developed sensors exhibit excellent performance in different environmental samples with high selectivity towards Hg^{2+} ions in the presence of other metal ions. For the analysis of coastal water samples, a low value of regression coefficient was observed due to the potential interference of salt in the sample. To overcome this, matrix-matching experiments were carried out. Developed Lys- AuNPs show good selectivity towards Hg^{2+} in matrixed matched diluted coastal water samples. With a sensitivity of 0.02 ppm, the sensor can be utilized to screen large numbers of coastal water samples for their Hg^{2+} content to satisfy coastal regulation norms. As a whole, this method is simple, sensitive, selective, cost-effective and can be used to screen large numbers of samples across the coastal area for monitoring Hg^{2+} concentration.

Keywords: *Coastal water; Mercury ions; colorimetric sensing, Matrix effect; Surface Plasmon Resonance; lysine capped nanoparticle.*

How to cite this article

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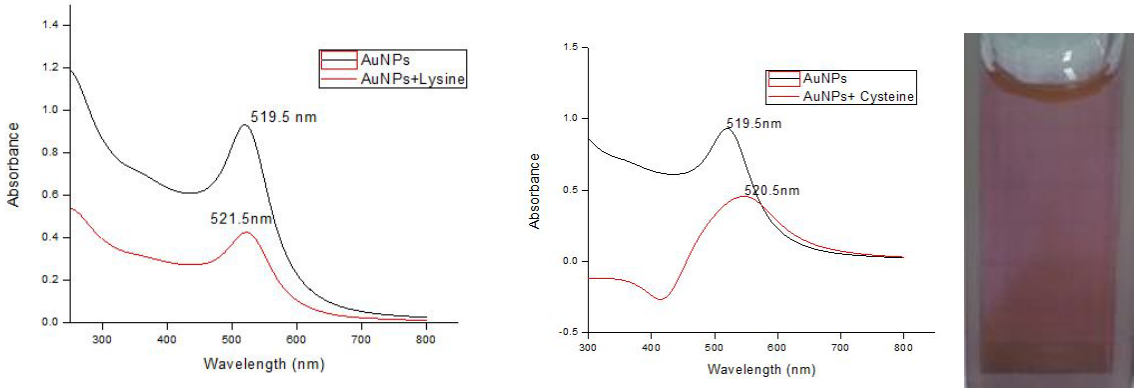

Figure SI-1 Spectrra representing AuNPs- Lys and AuNPs- Cys analysis using SPR technique

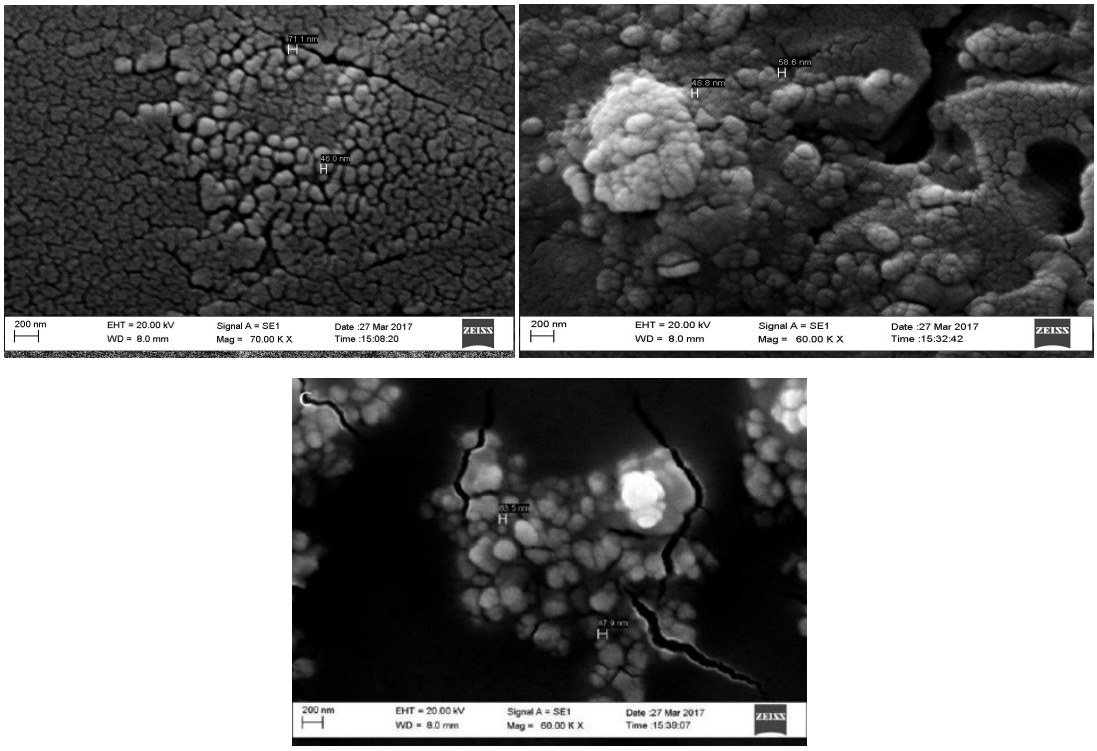

Figure SI-2 SEM images (clockwise) of (a) Citrate Capped AuNPs , (b) AuNPs-Lys and (c) AuNPs-Lys- Hg^{2+}

(a) before addition of amino acid, AuNPs are spherical in shape and of varying size from 41nm – 71nm. (b) After addition of lysine to AuNPs, no much difference was observed in shape and size (48nm-58nm) of AuNPs (c) large aggregates or deformation of original structure was observed in figure after addition of mercury solution.

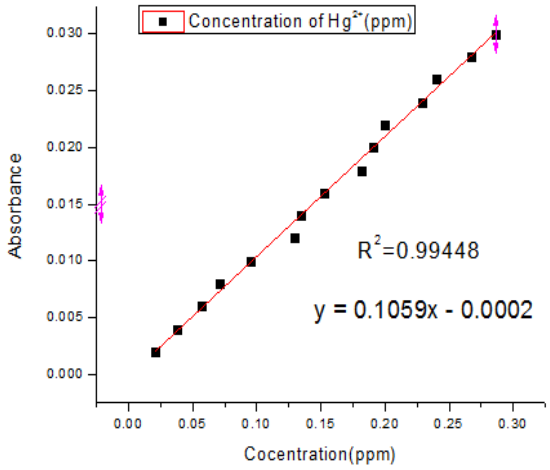

Figure SI-3 (a) Calibration plot for Hg^{2+} in the concentration range 0.002 to 0.2ppm in distilled water and Fig 3

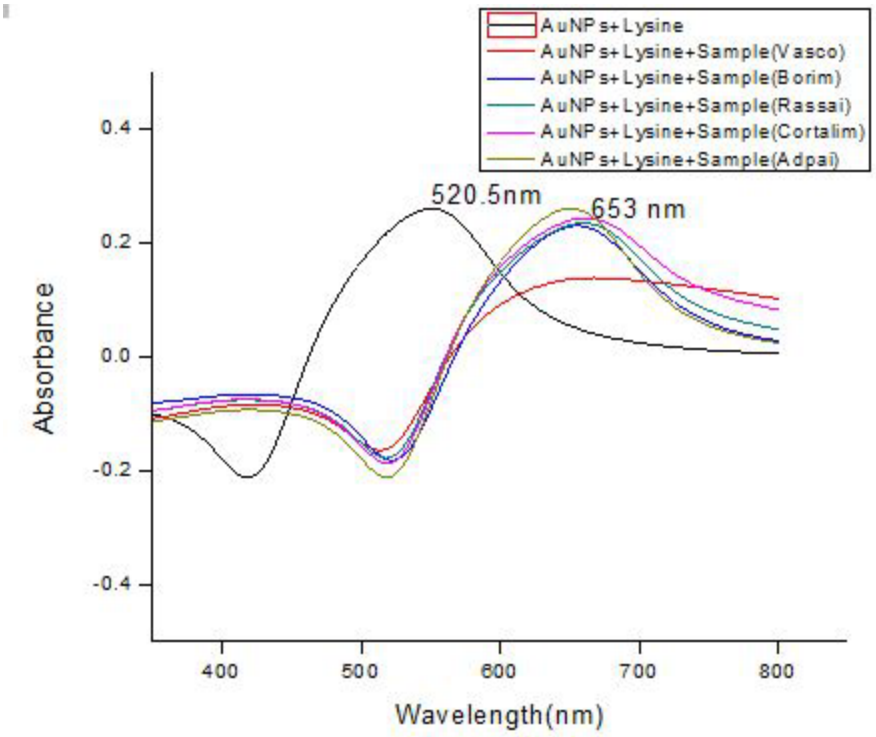

Figure SI-4 Spectrra representing AuNPs- Lys – Hg^{2+} analysis using water samples from site S-1 to S-5.