Title: Gold nanoparticles incorporated into halloysite nanotubes modified electrode for the amperometric determination of L-cysteine in serum samples

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Abstract: Gold nanoparticles incorporated on the aminopropyltrimethoxysilane functionalized halloysite nanotubes (AuNPs@APTMS/HNT) were synthesized and effectively detected L-Cysteine (L-CySH) concentration in serum samples. Analysis of the prepared nanocomposites was done using FT-IR, XRD, XPS, TGA, FE-SEM, and HR-TEM images. Nanocomposites were coated with GCE, and the voltammetric approach was employed under ideal experimental conditions to detect L-CySH electrochemically at a peak potential of + 0.35 V. To determine the diffusion coefficient, high current sensitivity, rate of the L-CySH reaction, and improved peak resolution of the modified electrodes have been performed using chromatoamperometry and differential pulse voltammetry studies. Lastly, the LOD and sensitivity of L-CySH were determined using the amperometry technique, and they were 0.18 nM and 2528 μA mM^{-1} cm^{-2}. AuNPs@APTMS/HNT/GCE offers enhanced properties like high anti-interference capability, outstanding repeatability, long-term stability, sensitivity, and so on. For the successful detection of L-CySH in serum samples, the proposed sensor achieves high recovery rates (R.S.D. < < 5%).

Keywords : Gold nanoparticles · Halloysite nanotubes · L-CySH · Amperometry · Serum samples

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