Highly Sensitive Lysine Biosensor based on Gold Nanoparticle and Multiwalled Carbon Nanotube Composite Modified Au Electrode

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ABSTRACT

An amperometric lysine biosensor was fabricated by immobilizing lysine oxidase onto gold nanoparticles (AuNPs)/multiwalled carbon nanotube (MWCNT) layer deposited on Au electrode via carbodiimide linkage. Transmission electron microscopy (TEM) for AuNPs and scanning electron microscopy (SEM), electrochemical impedance spectroscopy (EIS) and Fourier transform impedance spectroscopy (FTIR) studies were used to characterize the modified electrode. The sensor showed optimal response within 2s at 30ºC in 0.05 M sodium phosphate buffer pH 6.0, when polarized at +0.2 V vs. Ag/AgCl. Linear working range of the biosensor was 0.05 -700 µM, with a detection limit of 0.05 µM. Analytical recoveries of the added lysine into spiked milk samples at concentrations 50 µM and 100 µM were 86.0 and 87.0 % respectively. Within and between-batch coefficients of variation were < 3.5 % and < 4.2 % respectively. A good correlation (r = 0.98) was obtained between serum lysine levels measured by the standard HPLC method (y) and the present method (x). The sensor was used in 150 assays and had a storage life of 180 days at 4 ^{o}C.

***Keywords**:* Lysine, lysine oxidase, gold nanoparticles, multiwalled carbon nanotube