

Electrocatalytic application for gold nanoparticles decorated sulfur-nitrogen co-doped graphene oxide nanosheets and nanosized cobalt tetra aminophenoxy phthalocyanine conjugates

Abstract

Abstract Sulfur and nitrogen affinity for gold is utilized to self-assemble gold nanorods (AuNRs) on S, N doped or S/N co-doped graphene oxide nanosheets (SGONS/AuNRs, NGONS/AuNRs or SNGONS/AuNRs) for enhancement of the electrocatalytic activity of nanosized cobalt tetra aminophenoxy phthalocyanine (complex 1) towards hydrogen peroxide detection. Of the electrodes containing AuNRs, 1- SNGONS/AuNRs-GCE gave the lowest limits of detection (LOD) of 0.012 μM followed by 1- SGONS/AuNRs-GCE and 1- AuNRs-SNGONS(seq)-GCE both with LOD of 0.016 μM . This work shows that in the absence of GONS (when AuNRs are alone and in the presence of 1 in 1 /AuNRs-GCE), unfavorable detection limits are obtained and that doping of GONS is important in improving LOD. 1- SNGONS/AuNRs-GCE showed concentration dependent mechanisms resulting in two adsorption Gibbs energies (ΔG°) of $-18.55 \text{ kJ mol}^{-1}$ and $-17.35 \text{ kJ mol}^{-1}$ at high and low concentrations, respectively.