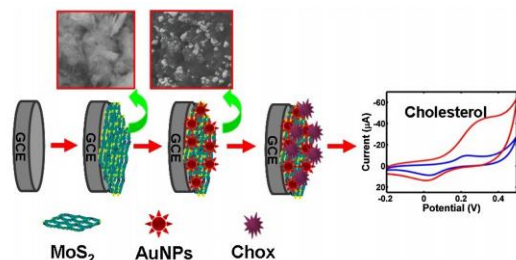
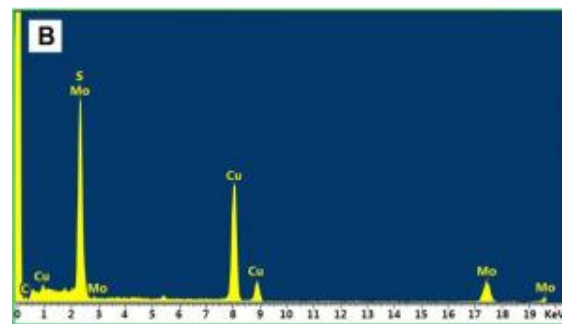


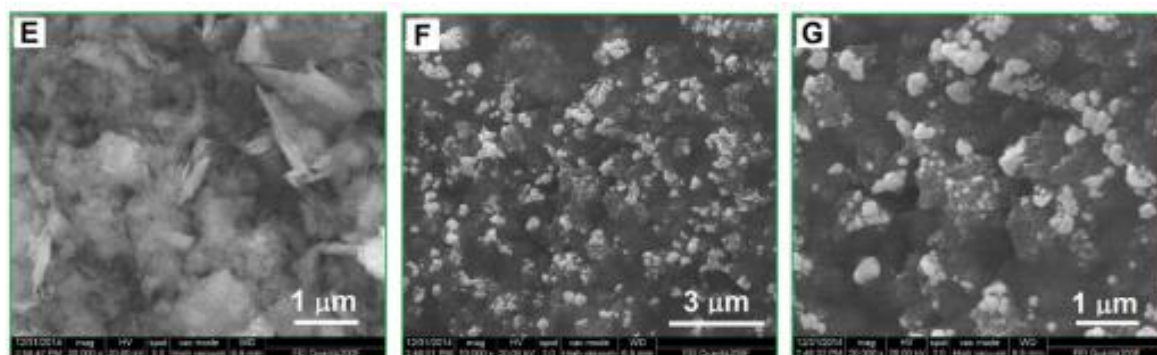
Electrochemical cholesterol sensor based on cholesterol oxidase and MoS₂-AuNPs modified glassy carbon electrode



Schematic of fabrication of the Chox/MoS₂-AuNPs/GCE



EDS spectra of MoS₂



SEM images of MoS₂/GCE (E), MoS₂-AuNPs/GCE (F and G)

1. Objective of work

To develop a biosensor able of quantify cholesterol on a small sample for faster diagnosis. The biosensor consists of a glassy carbon electrode covered with molybdenum disulfide (MoS₂), gold nanoparticles and cholesterol oxidase (Chox). This biosensor will measure the current generated by electro-oxidation reaction.

2. Sample description

MoS₂ was synthesized with the use of a hydrothermal method involving sodium molybdate and cysteine. The mixture MoS₂-Nafion was spread over the glassy carbon electrode (3 mm diameter) at room temperature. The MoS₂/GC was immersed to HAuCl₄, Na₂SO₄ and H₂SO₄ solution at -0.2 V (vs. SCE) for 30 s. Finally, a portion of the solution Chox/PBS was dropped onto the MoS₂-AuNPs/GC to complete the sensor.

3. Equipment and conditions for SEM and EDS

EDS was done using a JEM-2010 with a accelerating voltage set at 200 kV. The associated point and linear resolution were found to be 0.23 nm and 0.14 nm, respectively. The sample was placed on a carbon-coated copper grid, being dried in air at room temperature previously. SEM images were obtained using Quanta200F instrument with power level of 20 kV, The sample was electro-deposited or dropped onto the detachable GCE.

4. Results

The EDS analysis was performed to characterize the chemical composition MoS₂, confirming the existence of the element Mo, S and Cu. The morphology of MoS₂/GCE and MoS₂-AuNPs/GCE was investigated by SEM. It was observed a uneven, crumpled and layered structure of MoS₂ film in the surface of GCE. After the electrodeposition, roughly cylindrical nano-particles were distributed on the surface (100 nm diameter).