ABSTRACT

Nanotechnology is an emerging inter-disciplinary paradigm, which encompasses diverse fields of science and engineering converging at the nanoscale. The properties of nanomaterials are much dependent on the size and shape at nanoscale dimensions. A single material can show a wide range of physical and chemical properties, and it can be used for different applications by tuning the shape and size of the material. Therefore, the synthesis of shape and size controlled nanomaterials is a subject of great interest to researchers. Nanoparticles can be used to construct novel sensing devices; in particular electrochemical sensors. Tremendous efforts have been directed towards the development of non-enzymatic sensors for the measurement of biomolecules such as glucose, dopamine, etc. as it was established that the enzymatic sensors lack stability. Electrochemical detection is highly attractive for the monitoring of glucose, which is amperometric biosensor, a type of biosensor which measures the change in the current of a working indicator electrode by direct electrochemical oxidation or reduction of the products of a biochemical reaction.

Recently, nanomaterials based electrochemical sensors for the direct electrooxidation have been studied extensively due to their unique physical and chemical properties such as increased surface area, mass transport and catalysis. In the present study, we have chosen convenient bottom-up method i.e. co-precipitation method for synthesis of three different metal oxides (CuO, Cu₂O and NiO), C based-CuO (CNF-CuO, MWCNT-CuO, G-CuO and NG-CuO) and metal doped CuO (Au-CuO, Ag-CuO, Pt-CuO and Pd-CuO) composite nanomaterials. The synthesized metal oxides and their nanocomposites were characterized by XRD, UV-Vis, FT-IR spectroscopy, SEM, and electroanalytical techniques.

The neurotransmitter dopamine has shown to be of central importance to difference brain functions, such as movement, reward, and addiction. A biosensor for the detection of dopamine in the brain should have a fast time response to monitor concentration changes, which happen on a sub second time scale. Furthermore, the sensor should have a high sensitivity to dopamine, because the physiological concentrations of dopamine were found to be in the range from nanomolar to lower micro molar.