ABSTRACT

The synthesis of non-peripheral tetraamino transition metal phthalocyanines (4α-MTAPc; M = Mn\textsuperscript{III}, Ni\textsuperscript{II} and Cu\textsuperscript{II}), peripheral tetrathiometallophthalocyanine (4α-MTTPc; M = Ni\textsuperscript{II}) and tetrahydroxythiophenyl phthalocyanines (MTHTHPc; M = Co\textsuperscript{II}) and their self assembly on GC (4α-MTAPc) and Au (4β-MTTPc and 4β-MTHTHPc) electrodes have been studied. The electropolymerization method was also used for the preparation of a thin film of 4α-MTAPc on GCE. The MTAPc, 4β-MTTPc and 4β-MTHTHPc modified electrodes were characterized by cyclic voltammetry, Raman spectroscopy and AFM. The 4α-MTAPc were used to synthesize 4α-MTAPc capped gold and silver nanoparticles (AuNPs and AgNPs). The 4α-MTAPc capped AuNPs were used as a seed solution to prepare gold nanorods (GNRs) both in solution and on electrode surfaces. The synthesized nanomaterials were characterized by UV-visible spectroscopy and TEM. The TEM images showed that both AuNPs and AgNPs were spherical in shape. Further, AuNPs, AgNPs and GNRs modified electrodes were characterized by UV-visible spectroscopy, ATR-FT-IR, AFM, SEM and cyclic voltammetry.

The electrocatalytic applications of the different functionalized MPcs and AuNPs, AgNPs and GNRs modified electrodes were used to determine L-methionine, caffeine, guanine, adenosine, dioxygen, L-dopa, hydrazine and nitrite.
The practical application of the present method was demonstrated by determining L-methionine and caffeine in blood serum samples and adenosine in human blood plasma and urine samples. The obtained results were validated with the HPLC method.