SYNTHESIS, CHARACTERIZATION AND ELECTROCHEMICAL STUDY OF NEW NICKEL-SCHIFF BASE COMPLEX CONTAINING PYRROLE MOEITY: ELABORATION OF MODIFIED ELECTRODE BASED ON POLYPYRROLE FILMS

Ali OURARI and Djohra AGGOUN

Laboratoire d'électrochimie, d'Ingénierie moléculaire et de Catalyse Redox (LEIMCR), Faculté des sciences de l'ingénieur, Université Farhat Abbas de Setif, Route de Béjaia, Sétif 19000- Algeria. Tél. : +213.36.9251.33, Fax : +213.36.9251.33, e-mail: alourari@yahoo.fr

Key Words: Synthesis, pyrrolic nickel(II)-Schiff base, characterization, anodic oxidation, polymerization, modified electrodes.

This work is a continuation of previous papers describing the synthesis and characterization of new complexes of transition metals using teradentate Schiff bases as chelating agents [1]. This object is associated to an improvement of catalysis efficiency by using modified electrodes in heterogeneous catalysis [2]. Here, we have proceeded to the synthesis and characterization of new complex of nickel(III)-Schiff base containing the pyrrolic moieties. By an O-alkylation using kalium carbonate, the 3-bromo-N-propylpyrrole was introduced on one of the both hydroxyl groups of 2,6-dihydroxyacetophenone to obtain the compound a. This compound a 1 mM, in solution of absolute ethanol, reacts with 1,2-diaminoethane 0.5 mM in 2:1 molar ratio respectively. This mixture was refluxed for three hours to give b for which the nickel acetate 0.5 mM was added and the reflux was continued for six hours. So, the nickel(II)-6,6'-di[3''-propoxy-N-pyrrole]-7, 7'-dimethylSalen (monomer c), was synthesized and characterized by the usual spectroscopic and electrochemical methods. By an anodic oxidation, the monomer c was electropolymerized on glassy carbon disk and poly(c) is prepared as modified electrode. Some of its electrochemical characteristics are: (i) Films of poly(c) obtained from 10^{-3} M acetonitrile solution containing 0.1 M (n-Bu)4NClO4 on glassy carbon electrode (ψ=3 mm, v=100 mVs^{-1}, 25 scans). (ii) After transfer of this electrode in solution without monomer c and by integration under the oxidation wave (v=10 mVs^{-1}, Q_{ox} = 1.275 mC, \Gamma_{ppy} = 0.99x10^{-8} Mol.cm^{-2}. (iii) Same conditions than (ii) (v=10 mVs^{-1}, Q_{red} = 2, 88 mC, \Gamma_{Ni}= 42.24 x10^{-8} Mol.cm^{-2}. In conclusion, we think that these kinds of new materials as poly(pyrrole) films functionalized by species of tetradentate Schiff base complexes of transition metals seem to be very interesting for their diverse applications such as in analysis, catalysis, electrocatalysis and as sensors or biosensors etc...

REFERENCES