KINETICS OF Zn-TETRAPHENYLPORPHYRIN MODIFIED ELECTRODE

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Porphyrin class offers new additives similar to Co-oxyhydroxide (CoOOH) /1/.The behavior of modified stratified structures like solid solutions serves to increase the performances of obtained supports, generating in case of the electrochemically oxidized Ni/Zn- tetraphenylporphyrin (ZnTPP) photoelectrochemical modified electrode, anodic and cathodic peak current density values increases of 76-120 mA cm- 2 and 55-113 mA cm-2 corresponding to a sweep rate of 230-1200 mV s-1 /2/. The work proposes arguments connected with the photoelectrochemical modified electrode process kinetics useful to establish a reaction mechanism for the reported structure. The study of the kinetically parameters carried out by using cyclic voltammetry method evidenced the formation of new distinct products on the electrode surface along with polarization during illumination with light of different wavelengths. The electrode process evidenced also the increasing transferred electrons number from one to seven electrons in a single step in the final stage as presented in Table I. Table I.The dependence of transferred electrons number(n) on the polarization voltage(Ep) ,in 0.5M NaOH as electrolyte, for the electrochemically oxidized Ni/ZnTPP photoelectrochemical modified electrode, in the dark and after illumination at 425,575 and 600nm. Ep/mV/vsSCE ndark n425nm n575nm n600nm -100 1 1 1.2 1.2 0 2.1 2.1 2.8 3.3 +100 3.9 3.4 4.1 3.4 +200 4.1 4.3 5.2 4.1 +300 4.3 5.8 5.5 6.1 +400 5.7 5.8 5.9 5.9 +500 7.1 7.3 7.5 7.3 -100 6.6 6.9 7.1 7

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According to theory, the experimental dependencies evidence an irreversible electrode process, with the remark that ia / ic ratio is higher than unity/3-4/. ZnTPP is no longer present at the end of the electrochemical process because it was completely transformed, even the color modification of ZnTPP deposits can be noticed. REFERENCES

1.V.Z.Barsukov,L.N.Sagoyan,N.R.Mescheryakova and A.P.Gerasimov,Elektohymia,XXI,1,17(1985).
2.M.I.Ionita,Ph.D.Thesis,Institute of Physical Chemistry,Bucharest(1997).
3.R.S.Nicholson,Anal.Chem.,37,1351(1965).
4.R.S.Nicholson and I.Shain,Anal.Chem.,36,706(1964).