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Kinetic Study of Redox Probes on Glassy Carbon Electrode Functionalized by 4-nitrobenzene Diazonium

William Richard, David Evrard*, Pierre Gros

Laboratoire de Génie Chimique, Université de Toulouse, CNRS, INPT, UPS, Toulouse, France

*E-mail: evrard@chimie.ups-tlse.fr

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The electrochemical behavior of organic films grafted onto glassy carbon (GC) and bearing NO₂, NHOH or NH₂ groups was studied by using three different redox probes, namely ferricyanide Fe(CN)₆³⁻, hexaammineruthenium(III) Ru(NH₃)₆³⁺ and ferrocenemethanol FcMeOH. Films were prepared by grafting 4-nitrobenzene diazonium onto the GC surface by constant potential electrolysis for durations varying from 1 to 300 s. NO₂ groups were converted into NHOH and NH₂ by performing further electrolyses at the corresponding potentials. The redox probes were chosen because of their different global charge and electron transfer process. For all the as-obtained films, the Koutecky-Levich treatment was applied and the cathodic (β) and anodic (α) transfer coefficients were extracted. All these data were discussed and compared in order to better understand the structure and the electrochemical properties of the organic films.

Keywords: 4-nitrobenzene diazonium; electrode functionalization; stratified film; Koutecky-Levich analysis; electrochemical kinetics; redox probes

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