

Electropolymerization of N-vinylcarbazole in the presence of Galvinoxyl

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Abstract

The electropolymerization process of N-vinylcarbazole in anhydrous medium in the presence of 2,6-tert-butyl-a-(3,5-di-terbutyl-4-oxo-cyclohexadien-1-ylidene)-p-tolyloxy (Galvinoxyl), stable nitroxide radical, was studied. Electrolysis of the monomer at constant potential in the presence of Galvinoxyl, generated an adduct between both species. In order to corroborate the structure of the products, they were separated from the electrolytic medium by chromatography and then characterized using UV-vis, ¹H-NMR and ¹³C-NMR spectroscopy, and elemental analysis. The adduct turned out to be a stable species formed by the union of the nitroxide radical to the vinyl group of the monomer. Blocking of this polymerization site allows, by further electro-oxidation, the selective formation of the green polymer, which corresponds to a polymer obtained by the link through carbons of the aromatic rings of the monomer, i.e., through a site that is not very reactive. Thus, we have a simple and swift alternative to produce in situ the appropriate precursor to obtain a deposit whose structure and electrochemical response may be useful for the development of sensors. In addition, the possibility that Galvinoxyl being able to "trap" the radical species generated by electro-oxidation of the monomer, affords a better control upon the electropolymerization process, and, consequently, upon the morphology of the respective deposit. This approach was corroborated by scanning electron microscopy (SEM) which demonstrated that the surface is much more homogeneous when the polymer is obtained from the adduct between N-vinylcarbazole and Galvinoxyl.