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In situ electropolymerization of conducting polypyrrole/carbon nanotubes composites on stainless steel: Role of carbon nanotubes types

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Abstract

In situ electropolymerization was used to prepare polypyrrole-oxidized multi-walled carbon nanotubes and polypyrrole-oxidized single-walled carbon nanotubes composites on a stainless steel surface from 0.1 M oxalic acid by using cyclic voltammetry. The electropolymerization process was investigated and discussed, and the results showed that the addition of the oxidized carbon nanotubes greatly enhanced the electropolymerization process, especially in the case of oxidized single walled carbon nanotubes. The results also showed that increasing the pyrrole monomer concentration leads to increasing the amount of polypyrrole electrodeposited, and this is more pronounced in the presence of the carbon nanotubes. The electropolymerization process was mainly under diffusion control as the process was inhibited by increasing the scan rate. In general, the presence of oxidized carbon nanotubes improved the electropolymerization of the polypyrrole and greatly enhanced its thermal and morphological properties. (C) 2012 Elsevier B.V. All rights reserved.

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