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Electrocatalytic behaviour of nanocomposites of carbon nanomaterials with monomeric and electropolymerized metallo-phthalocyanines on glassy carbon electrode

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Thin films of MPcs on solid electrode surfaces have been fabricated by different pathways including adsorption, electropolymerization and click chemistry to name just a few. In this work, electrocatalytic platforms were fabricated using (i) adsorption of the nanomaterials and metallophthalocyanines (MPcs), and (ii) electropolymerisation of the metallophthalocyanines on a glassy carbon electrode (GCE). Polymerization is more reliable, often reproducible than adsorption and the thickness of the film can be controlled by the number of polymer cycles. The derivatives of MPcs have polymerizable groups on the substituents and we used X-ray photoelectron spectroscopy (XPS) to confirm the point of polymerization. We compared the electrocatalytic activities of the adsorbed and polymerized complexes. Techniques such as cyclic voltammetry (CV), chronoamperometry (CA), and rotating disk electrode (RDE) studies were used for electrochemical characterization of the prepared nanocomposites. The electrocatalytic activity of the polymerized MPc derivatives used was found to be superior when polymerization was done on top of multi walled carbon nanotubes (MWCNT) than bare glassy carbon electrode. Also, nanocomposites of metallophthalocyanines with quantum dots intercalated graphene nanosheets revealed better electrocatalysis.

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