Graphene Nanosheet and Carbon Nanotube based Nanocomposites as an Electrode Support for Fuel Cells

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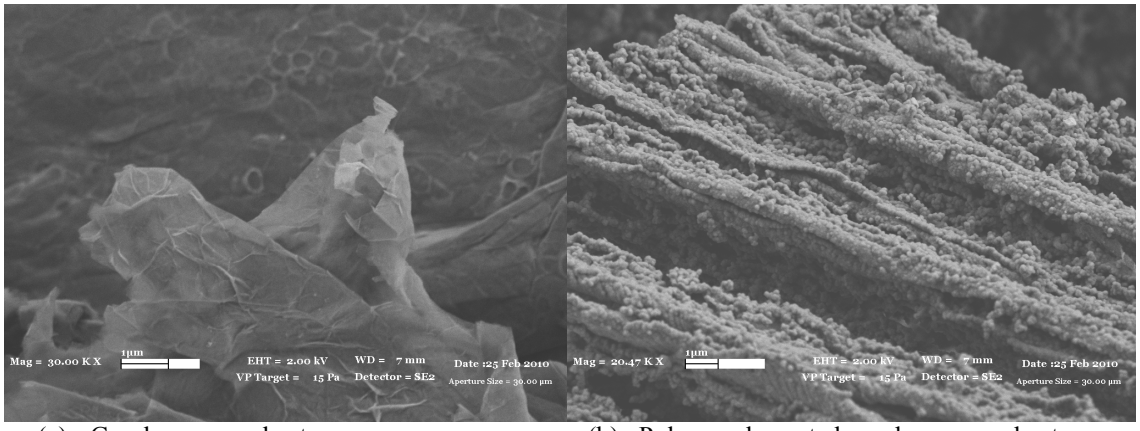
An electrode support material in fuel cells has great influence on catalyst dispersion, charge transport, and stabilization of the catalyst particles. Graphene and carbon nanotubes have been considered as a fuel cell electrode material due to their high specific surface area, exceptional electronic and mechanical properties. The mesopores in graphene nanosheets and carbon nanotube electrodes are interconnected, providing a continuous charge distribution that uses nearly all of the available surface area. In present work, for the production of advanced type of electrode materials, the distinguished properties of graphene nanosheets and multi walled carbon nanotubes were combined with the structural properties of conducting polymers (polypyrrole) by the incorporation of graphene and carbon nanotubes into a polymer matrix. Graphene nanosheets were exfoliated from graphite by a mild chemical treatment including graphite oxidation using sulphuric acid and potassium dichromate, ultrasonic treatment, and chemical reduction by hydroquinone. Pyrrole was coated on graphene nanosheets and carbon nanotubes by in situ polymerization by different feeding ratios. Graphene nanosheet and carbon nanotube based nanocomposites were compared according to their structural properties, thermal stabilities and electrical conductivities. Samples were analyzed in detail by SEM, XRD, TGA, AFM, TEM, FTIR and Raman Spectroscopy**.**

Keywords: graphene nanosheets, carbon nanotubes, nanocomposites, fuel cell electrode



(a) Graphene nanosheets (b) Polypyrrole coated graphene nanosheets

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