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# Fabrication and characterization of reduced graphene oxide based polymer composite membranes

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**Abstract**

The ever growing population environmental pollution and ecological degradation cause suffering to human race due to chemical and other water contaminants such as chemicals, heavy metals, pesticides and insecticides. Hence the main attempts are made to purify water by advanced technologies employing smart materials. The advanced Nanotechnology aids to control structural and chemical functionality in the composite material which potentially escort novel membrane technology involved in water purification and portrays existing membrane technology designed approaches for engineering biopolymer based selective membrane. PVB is a thermoplastic material that is soluble in a large number of organic solvents, but it can be cross-linked with various species owing to OH groups in order to improve solvent, chemical and thermal resistance. It is composed of vinyl butyl, vinyl acetate and vinyl alcohol monomer unit structure and properties are strongly dependent on the hydroxyl content. To enhance the ionic conductivity of a polymer electrolyte was proven to be the incorporation of low molecular weight as well as high dielectric constant plasticizers like ethylene carbonate (EC), propylene carbonate (PC), etc. These plasticizers were found to facilitate both improving the ionic conductivity as we as increasing the amorphous content, thereby dissociating ion aggregates and lowering the glass transition temperature of polymer electrolyte. In order to increase the ionic conductivity polymer composite an attempt has been taken to incorporate the LiClO4, EC and PC as plasticizer with the host polymer. Graphene oxide (GO) is a unique material that can be viewed as a single monomolecular large of graphite with various oxygen containing functionalities such as epoxides carbonyl, carbonyl and hydroxyl groups. GO is reduced, the reduced graphene oxide formed resembles graphene but contains residual oxygen and other heteroatoms as well as structural defects. Polymer nanocomposite electrolyte standing films were prepared by well known phase inversion technique and reduced graphene powder prepared by slight moderation of Hummer's method. Structural behaviour of developed membrane namely {30[(PVB)0.95-(LiClO4)0.05)]-70[EC+PC]} and {[30(PVB)0.95-(LiClO4)0.05-70(EC+PC)]99.2-[rGO]0.08} were evaluated with the help of various spectroscopies e.g. XRD, Impedance and IR investigations. Results explore the effect of plasticization on electrical conductivity and other physical properties. Spectroscopic studies also confirm the interaction of salt, plasticizer and polymer, which tries to modify the matrix for the better ionic movement. XRD curve emphasizes that the plasticization enhances the amorphous content with altering the host structure of the polymer. The electrical conductivity depends on combination of plasticizers. The maximum conductivity was obtained with {[30(PVB) 0.95-(LiClO4)0.05-70(EC+PC)] 99.2-[rGO] 0.08} composite. This novel mechanism opens a new door in Polymer Composite Science and Technologies.

**Biography**

Dr. Nidhi Asthana is directly involved in fabricating thin film of polymer nanocomposite and Design and development of annealing system with a controlled temperature. She is presently working as "Women Scientist" from DST Government of India, New Delhi, Under WoS-A Scheme. She has got two best paper awards in International Conferences. She is member of Editorial Board in Life Science (TMR Publishing) China. She has published more than 25 papers in National and International Journals. She has also attended more than 30 National and International Conferences. She has also published book chapters in repudiated journals..

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