International Journal of ChemTech Research
CODEN(USA): IJCRGG, ISSN: 0974-4290, ISSN(Online):2455-9555
Vol.10 No.10, pp459-473,2017

Electro-oxidation of ethanol onto Pt/rGO/C, Pt/rGO-G, Pt/rGO-CB/C and Pt/rGO-ZSM/C Composite Carbon-felt Electrode for Fuel Cell Application

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Abstract: Present study reports, electro-oxidation of ethanol onto platinum (Pt) loadedreduced graphene oxide/Carbon-felt (Pt/rGO/C), rGO-graphite/C-felt composite (Pt/rGO-G/C), rGO-carbon black/C-felt, (Pt/rGO-CB/C) and rGO-ZSM-5/C-felt composite (Pt/rGO-ZSM/C) electrodes. GO was synthesized by conventional, simple and green Hummer's Method. rGO-CB, rGO-G and rGO-ZSM was prepared by mechanical mixing at a fixed ratio.From the electrochemical studies, it was found that Pt/rGO-G/C and Pt/rGO-CB/C proved to be a better and more durable electrocatalyst compared to Pt/rGO/C and Pt/C. However, Pt/rGO-ZSM/C proved the best electrocatalyst. Apparent activation energies of ethanol electro-oxidation over these electrodes are found to be in the order of Pt/C <Pt/rGO/C <Pt/rGO-G/C <Pt/rGO-CB/C <Pt/rGO-G/C. CB or G acts as hinders to inhibition of stacking of rGO sheets, as effective "spacers". CB or G have many defects and act as second support material over which PNPs deposited are smaller in size, compared to deposition over bare rGO/C or C-felt surfaces. ZSM-5 enhances the catalytic power of PNPs by facilitating formation of smaller PNPs and also by cleansing away adsorbed CO from the Pt surface.The present study thus will lead to a new avenue in the field of fuel cell electro-catalysts.
Keywords: Fuel cells; Graphene; Carbon; Zeolites; Hybrid composites.

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