

Synthesis and Characterization of Pt/NTC/WO_x Electrocatalysts for Oxygen Reduction Reaction

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ABSTRACT

Recent research has been developed on electrocatalysts for ORR in which decomposition of the support and particularly in the cathode side was found. This phenomena is compromising the useful life of the fuel cells, since the carbon vulcan is oxidized to CO₂ in the operating conditions of the cell. In order to improve operation, carbon support has been combined with a semiconductor in different proportions to increase stability and catalytic activity. In particular, on this work Pt and different compositions of WO_x were used to know the optimal composition and obtain greater potential difference and current in a PEM fuel cell, in addition to increasing the useful life of the same cell.

Results on cathode electrocatalysts synthesis by the the polyol method are shown. This method was chosen in order to obtain particle sizes of less than 10nm, because according to the literature, smaller particle size produce enhanced catalytic activity by increasing contact area. A solution of diethylene glycol (DEG) with platinum chloride and multiwalled carbon nanotubes was refluxed for 4 hours at 214 ° C. Resulting solution after reflux process was filtered and washed with ethanol to remove DEG excess. Nanotubes underwent an exfoliation treatment to increase the surface area and get a higher dispersion of the active phase, which allow oxygen diffusion and improvement of reaction kinetics.

A tungsten salt was added into Pt/ NTC catalyst suspension to form the Pt/NTC/WO_x catalyst. The results are shown by means of linear sweep voltammetry (LSV), scanning electronic microscopy (SEM), transmission electronic microscopy (TEM) and X-ray diffraction (XRD) and compared with the performance of catalyst 10% Pt/90% NTC.

Keywords: Electrocatalyst, PEM fuel cell, polyol mediated synthesis.

