

Experimental Investigation of Proton Exchange Membrane Fuel Cells Operated with Nano Fiber and Nano Fiber/Nano Particle

Authors : Kevser Dincer, Basma Waisi, M. Ozan Ozdemir, Ugur Pasaogullari, Jeffrey McCutcheon

Abstract : Nanofibers are defined as fibers with diameters less than 100 nanometers. They can be produced by interfacial polymerization, electrospinning and electrostatic spinning. In this study, behaviours of activated carbon nano fiber (ACNF), carbon nano-fiber (CNF), Polyacrylonitrile/carbon nanotube (PAN/CNT), Polyvinyl alcohol/nano silver (PVA/Ag) in PEM fuel cells are investigated experimentally. This material was used as gas diffusion layer (GDL) in PEM fuel cells. When the performances of these cells are compared to each other at 5x5 cm² cell, it is found that the PVA/Ag exhibits the best performance among all. In this work, nano fiber and nano fiber/nano particles electrical conductivities have been studied to understand their effects on PEM fuel cell performance. According to the experimental results, the maximum electrical conductivity performance of the fuel cell with nanofiber was found to be at PVA/Ag. The electrical conductivities of CNF, ACNF, PAN/CNT are lower for PEM. The resistance of cell with PVA/Ag is lower than the resistance of cell with PAN/CNT, ACNF, CNF.

Keywords : proton exchange membrane fuel cells, electrospinning, carbon nano fiber, activate carbon nano-fiber, PVA fiber, PAN fiber, carbon nanotube, nano particle nanocomposites

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