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Nanomaterial functionality in polymer electrolyte membranes

Ramesh T Subramaniam

University of Malaya, Malaysia

Abstract

Nanomaterials such as fumed silica, zirconium dioxide, carbon nanotube, silver oxide etc. are the emerging materials that have significant effect in tailoring the lacking properties in polymer electrolyte membranes. This material is an attractive candidate owing to its small particle size which has high penetration ability into the matrix with less restriction towards its free flow mobility. The embedment of nanomaterials into the polymer matrix is found to improve the conducting nature along with its mechanical strength. The conducting nature is improved with the presence of polar functional group in the nanomaterial that acts as a transit site for the hopping of charge carriers. As for the mechanical strength, the small sized nanomaterial improves this property by filling up the spaces of the pores and forming a network with the atoms at the outer most surface of the pores, eventually closing the pores. The beneficial functionality of nanomaterial is being applied in the matrix formed from an acrylate based copolymer and this formulation is found to possess added advantages such as behaving as an adhesive and being mechanically elastic. The formulation of a thin film membrane with the combination of adhesion and elastic property creates a platform for utilization in the electrochemical device applications. This dry-natured thin film polymer electrolyte is found to be a good replacement for the commercially available liquid type and subsequently improves the safety of the applications with the most concern focusing on portable type applications.

Biography

Ramesh T Subramaniam completed his PhD from University of Malaya, Malaysia in the field of Advanced Materials. His accomplishment in the area of green polymer electrolytes has earned him the recognition as a prominent researcher in this field. He has received many awards and recognition namely TWAS Young Affiliate Fellow for the period 2009-2013, Pacifichem Young Scholar Award 2010, Young Scientist Award 2011 from IUPAC, IAP Young Scientist 2012 and GYA Young Scientist 2013. To date, he has published and presented more than 130 papers. His total number of citations is more than 700 with an *h*-index of 15.