

6<sup>th</sup> International Conference and Exhibition on

# Materials Science and Engineering

September 12-14, 2016 Atlanta, USA

## Polyelectrolyte nanocomposite membranes using imidazole-functionalized nanosilica for fuel cell applications

Elham Jafarnia

Sharif University of Technology, Iran

The preparation and characterization of a new type of nano composite polyelectrolyte membrane (PEM), based on DuPont™ Nafion®/imidazole modified nanosilica (Im-Si), for direct methanol fuel cell (DMFC) applications is described. Related to the interactions between the protonated imidazole groups, grafted on the surface of nanosilica, and negatively charged sulfonic acid groups of Nafion, new electrostatic interactions can be formed in the interface of Nafion and Im-Si which result in both lower methanol permeability and also higher proton conductivity. Physical characteristics of these manufactured nanocomposite membranes were investigated by scanning electron microscopy (SEM), thermogravimetric analysis (TGA), differential scanning calorimetry (DSC), Fourier transform infrared spectroscopy (FTIR), water uptake, methanol permeability and ion exchange capacity, as well as proton conductivity. The Nafion/Im-Si membranes showed higher proton conductivity, lower methanol permeability and, as a consequence, higher selectivity parameter in comparison to the neat Nafion or Nafion/silica membranes. The obtained results indicated that the Nafion/Im-Si membranes could be utilized as promising polyelectrolyte membranes for direct methanol fuel cell applications.

elhamjaafarnia2000@gmail.com

## Titanium diboride as particulate reinforcement in aluminum matrix composite: A review

Harminder Singh Bains<sup>1</sup> and Arvinder Singh Channi<sup>2</sup><sup>1</sup>Punjab University SSG Regional Centre, India<sup>2</sup>IKG Punjab Technical University, India

The ever growing demand for lighter and cheaper material has created the importance of composite as alternate to monolithic material. Metal matrix composites (MMC) are replacing structural steel and other monolithic material for structural, automobile, thermal, electrical applications. Main advantage of MMCs in transportation sector are lower fuel consumption, less noise and lower airborne emissions. TiB<sub>2</sub> has emerged as better particulate reinforcement when compared to SiC, Al<sub>2</sub>O<sub>3</sub> and B<sub>4</sub>C due to the fact that it is having high hardness and good wear resistance which makes its use in seals, wear parts hybrid composites and cutting tools. Of late, lot of interest has been generated in researchers and practicing engineers in manufacturing of composites via stir casting route. Present papers reviews the mechanical and wear properties of different particulate that reinforced aluminum metal matrix composites vis a vis Al/TiB<sub>2</sub>p. MMC are processed through stir casting route.

bains.harminder63@gmail.com