

Title **New generations of nanocomposite polymer electrolyte membranes for fuel cell applications**

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Date & Time Tuesday, February 12, 2019 4:00 p.m.

Place I²CNER hall, I²CNER Bldg.1, Ito Campus, Kyushu University

Abstract

Polymer electrolyte membranes (PEMs) represent a class of versatile ionic materials that are contributing to the remarkable progress taking place in a broad spectrum of electrochemical energy generation and storage systems supporting the growth of renewable energy applications. Such materials acts as ion conductors and barriers in electrochemical applications such as PEM fuel cells, vanadium redox flow batteries, and PEM electrolyzers. PEMs have the potential to be fabricated in thin films with large quantities, bear variety of functional groups for tailored applications with high flexibility and provide good interfacial electrode/electrolyte contacts. PEMs are prepared using a variety of polymerization and functionalization techniques and the current PEMs are challenged by essential requirements in terms of ionic conductivity, chemical stability, mechanical integrity and durability. Thus, the development of advanced PEMs capable of meeting the growing demands for energy conversion and storage continued to be a research focus. This presentation reviews the latest progress in the development of new generations of nanocomposite PEMs for various types of fuel cells. This includes nanocomposite membranes for high temperature PEM fuel cell (HT-PEMFC), direct methanol fuel cell (DMFC) and anion exchange membrane fuel cell (AEMFC) using various preparation strategies. The present challenges and future research directions in the development of PEMs are also elaborated.

About the Speaker

Dr. Nasef is currently a Professor in Chemical Engineering Department at Universiti Teknologi Petronas (UTP) since June 2017. Previously, he served as a Professor in Chemical Process Engineering in Malaysia-Japan International Institute of Technology (MJIT) and in Chemical Engineering Department in the Faculty of Chemical and Renewable Energy Engineering at Universiti Teknologi Malaysia (UTM) for 10 years. He was also designated as the Deputy Director of Institute of Hydrogen Economy in UTM from 2010 to 2016.

Prof. Nasef is a registered expert in the international Atomic Energy Agency (IAEA) in the field of radiation processing of polymers and he served a number of expert missions in this field in several countries. He served as Chief Investigator in the coordinated research projects (CRP) awarded by IAEA to Malaysia (2007-2010). Prof. Nasef authored more than 140 articles in renowned journals in addition to 12 book chapters and 12 review articles with H-Index of 34. Prof. Nasef is an active member in various professional societies such as American Chemical Society, Institute of Chemical Engineers, Electrochemical Society and Asian Polymer Association. His research interests include but not limited to the ionic and functional polymeric materials for renewable energy and environmental applications with special emphasis on the development of new polymer electrolyte membranes, separators and adsorbents for electrochemical systems and separation/purification applications.

Host: Professor Naotoshi Nakashima

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