

## Sulfonated Polystyrene/PTFE Composite Membranes for Direct Methanol Fuel Cell

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### ABSTRACT

This paper reports on the preparation and characterization of sulfonated PS/PTFE composite membranes for the direct methanol fuel cell (DMFC). The composite membranes with various compositions of styrene/DVB were prepared through impregnation of monomer mixtures, thermal crosslinking polymerization and sulfonation with chlorosulfonic acid. Ion conductivity and methanol permeability of the sulfonated composite membranes were investigated. It was found that the methanol permeability, with decrement of styrene/DVB ratio, varied from  $6.6 \times 10^{-7}$  to  $1.3 \times 10^{-7}$  cm<sup>2</sup>/s, indicating that they hold better properties than Nafion<sup>®</sup> 117 ( $1.02 \times 10^{-6}$  cm<sup>2</sup>/s). Ion conductivity ranged from 0.11 S/cm (25 °C) to 0.08 S/cm (25 °C) with decrement of styrene/DVB ratio, comparable to the value of Nafion<sup>®</sup> 117 (0.0824 S/cm).

**Keywords:** DMFC, composite membrane, porous PTFE, sulfonated and crosslinked polystyrene