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**Doped poly (2, 5-benzimidazole) membranes for high temperature polymer electrolyte fuel cell: influence of various solvents during membrane casting on the fuel cell performance**

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**Abstract**

Poly (2, 5-benzimidazole) (ABPBI) membrane was prepared via membrane casting method using four different solvents, viz. methane sulfonic acid (MSA), trifluoroacetic acid (TFA), formic acid (FA) and sulfuric acid (SA). Phosphoric acid (PA) was doped in the corresponding ABPBI membrane to enhance the proton conductivity. It has been observed that the ABPBI membrane prepared by different solvents absorbed different amount of PA with varying level of doping, which led to different extent of hardness and Young's modulus as shown via nano-indentation analysis. ABPBI membrane prepared using trifluoroacetic acid doped ABPBI membrane (dABPBI-TFA) showed highest proton conductivity of  $1.6 \times 10^{-3} \text{ S cm}^{-1}$  at 150 °C. Fuel cells were fabricated using ABPBI-MSA and ABPBI-TFA based membranes and the performances were evaluated. Current density of 403 and 221 mA/cm<sup>2</sup> was achieved at 0.6 V respectively for the cell based on ABPBI-MSA and ABPBI-TFA membrane when operated at 150 °C.

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