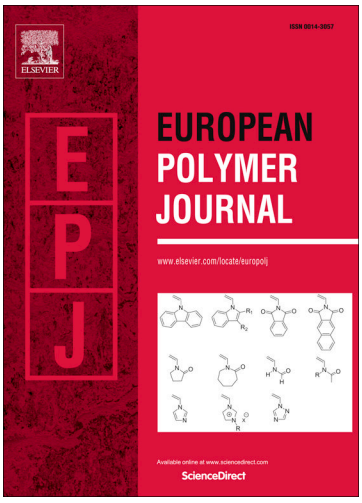
Accepted Manuscript



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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PII: S0014-3057(17)30495-0
DOI: http://dx.doi.org/10.1016/j.eurpolymj.2017.08.026
Reference: EPJ 8019

To appear in: *European Polymer Journal*

Received Date: 22 March 2017
Revised Date: 8 August 2017
Accepted Date: 12 August 2017

Please cite this article as: Nayak, R., Sundarraman, M., Ghosh, P.C., Bhattacharyya, A.R., 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, *European Polymer Journal* (2017), doi: http://dx.doi.org/10.1016/j.eurpolymj.2017.08.026

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 1.6×10^{-3} S cm^{-1} at 150 ºC. 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^2 was achieved at 0.6 V respectively for the cell based on ABPBI-MSA and ABPBI-TFA membrane when operated at 150 ºC.