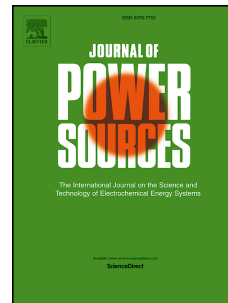


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# Proton conducting sulfonated poly (imide-benzimidazole) with tunable density of covalent/ionic cross-linking for fuel cell membranes

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## Abstract:

Ionic cross-linked sulfonated polyimides containing bis-benzimidazole rings have been prepared from 1,4,5,8-naphthalenetetracarboxylic dianhydride (NTDA), 6,6'-bis[2-(4-aminophenyl)benzimidazole] (BAPBI) and 3,3'-bis(4-sulfophenoxy)-benzidine (BSPOB). A new cross-linker, 4,4'-bibromomethenyl diphenyl ether, is used to induce covalent cross-linking between halogen and imidazole groups in SPIBI chains *via* a facile thermally activated reaction. The resulted covalent and ionic cross-linked membranes show an improved resistance to hydrolytic attack in deionized water at 80 °C (more than two months) and free radical attack in Fenton's solution (more than 690 min) as compared to non-cross-linked SPIBIs (less than two days and 270 min, respectively). Cross-linking also results in a reduction in proton conductivity due to the blockage of a hydrophilic channel. However, all the prepared CBr-ySPIBI-x membranes show a proton conductivity higher than  $10^{-2}$  S cm<sup>-1</sup> under

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