

Durability enhanced proton exchange pore filling membranes for electrochemical cells

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The highly cross-linked membranes were prepared by pore-filling technique for the application to proton exchange membrane fuel cells (PEMFCs). In general, the electrolyte, which is filled into the pores and which can be dissolved in water easily, should have the high IEC compared to the membrane prepared by casting method. Hence, the crosslinking agent is employed to prevent the polymer electrolyte from being dissolved in water. The higher crosslinking density is, the stronger mechanical ability is. Meanwhile, ion exchange capacity (IEC) decreases. To solve this problem, we used a crosslinking agent consisting of many cross-linkable sites in a molecule, which might be able to improve properties of the membranes without decrease in IEC. We evaluated membrane characteristics using two different types of the crosslinking agents. The physico-chemical properties of the prepared membranes such as the water uptake, ion exchange capacity and ionic conductivity were investigated in correlation with the electrolyte composition. Also the thermal and the structural property of the prepared pore-filling membranes were evaluated by TGA, FT-IR and SEM.