

ALKALINE FUEL CELL USING ANIONIC MEMBRANE

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Abstract

An alkaline solid polymer electrolyte for fuel cell has been developed in CNAM laboratory. The membrane was obtained by grafting quaternary ammonium groups (DABCO) on an elastomeric epichlorhydrin polymer. This polymer is dissolved in an appropriate solvent (DMF) in which the ternary diamine is also added and let to react with the polymer for about a day. The membrane is then cast from this solution and cooked at 120°C for more than an hour so that an appropriate cross-linking of the active polymer is obtained. The cross-linking is realized through reaction of the second ternary ammonium function included in DABCO.

The possibility of using such a membrane in an alkaline membrane fuel cell was checked first by evaluating its stability in potassium hydroxide solutions. The experiments showed a very good stability of the membrane characteristics during these ageing tests. The physico-chemical characterization (number of quaternary ammonium per gram of polymer around 1 meq g⁻¹, OH⁻ transport number over 0.95, etc.) reveals sufficient properties for fuel cell applications.

This membrane was then used to assemble an alkaline fuel cell. First, gas diffusion electrodes have then been synthesized using Pt/C catalyst; their test in half cell configuration in molar KOH showed rather similar results with and without the addition of the membrane, exhibiting the membrane good anionic transport properties. Tests in fuel cell have also been attempted.

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