Development of Aromatic Polymer Electrolyte Membrane for Fuel Cell

Kohei Goto(後藤　幸平),
Research Fellow Laboratory at Tsukuba ,
JSR Corporation,
25 Miyukigaoka, Tsukuba, Ibaraki 305-0841 Japan
E-mail:kouhei_gotou@jsr.co.jp

Novel polymer electrolyte membrane for fuel cell applications were developed and produced in semi-industrial scale from sulfonated aromatic polymers. Rigid poly(*p*-phenylene) structure of polymer backbone combined with its high ion exchange capacity offered superior mechanical strength and higher proton conductivity of membranes compared with conventional per-fluorinated material (Fig.1, 2, 3).

A microphase-separated morphology of polymer electrolyte membranes prevented from their excessive swelling under high-humidity conditions and provided excellent performance characteristics of hydrogen fuel cells in fuel cell vehicles in the temperature range from -20 to +95°C (Fig.3, 4).

Presently developed polymers showed also a good potential for the use in direct methanol fuel cells, designed as power sources for mobile phones, laptop computers, *etc.*

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後藤　幸平（Kohei GOTO）　JSR㈱特別研究室（Research Fellow Laboratory at Tsukuba, JSR Corporation）

Fig.1. Membrane produced in semi-industrial scale

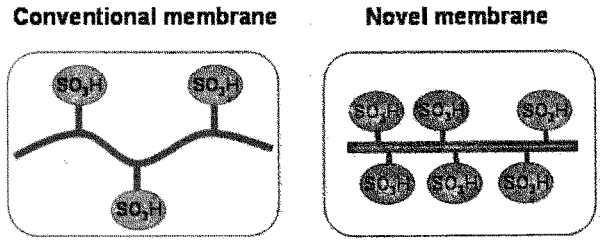

Fig. 2. Polymer Design

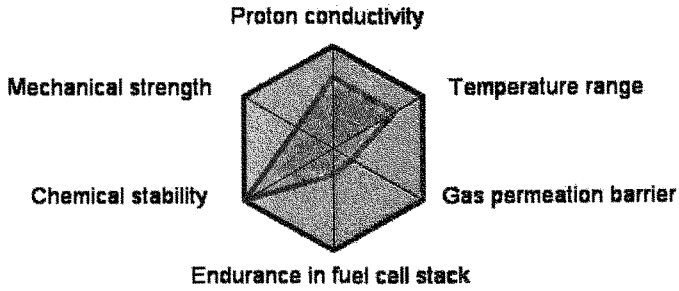

Fig. 3. Properties of JSR membrane

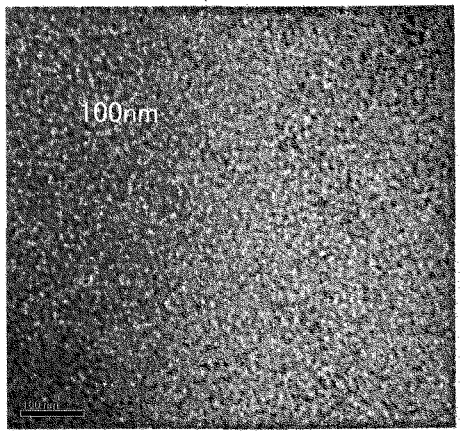

Fig. 4. TEM image of JSR membrane