

Development and Long-Term Operation of Direct Methanol Fuel Cell Stack

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A 5-cell stack and a 20-cell stack were fabricated by connecting the same MEA in series of which the area was 50 cm² (10 X 5 cm). MEA was made by using Nafion 115 membrane, PtRu catalyst and Pt catalyst. The stack has the internal manifolds for the supply of air and fuel. Maximum power of 5-cell stack was over 17 W. Long-term operation of this stack was performed over 4,000 hrs under constant load of 4 A. The voltage of the stack decreased slightly under constant load and showed the 18% decrease of stack power after the operation of 2,000 hrs. After a shutdown of 3 days, the stack performance was recovered upto 95% of the initial state under the same operating conditions. 20-cell stack was fabricated and the dimension of the stack was 122 x 75 x 66 mm. Cell pitch was 2.8 mm and thickness of end plate was 5.0 mm. Maximum power of the stack was 113 W at 20 A under the fuel and air flow rate of the 2.5 times of stoichiometric amount and thus the power density was 187 W/L. The optimum stoichiometric ratios of the anode flow (1M methanol solution) and the cathode flow (air) were 2 and 2.5, respectively.