

Operation time dependence on performance degradation of direct methanol fuel cell

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Direct methanol fuel cell (DMFC) is a promising candidate for application in portable power sources because of easy handling of liquid fuel and high power density. Nowadays, development of DMFC was focused on improving performance of catalysts and membrane, however, long term stability is a key factor for practical use. This study shows operation time dependence on performance degradation of direct methanol fuel cell.

The MEAs were prepared by the decal transfer method. Catalyst loading was 2 mg/cm² for both the PtRu (anode) and Pt (cathode) catalysts. The prepared MEAs were operated at a constant current of 100 mA/cm². Operation conditions were 1 ml/min 1 M methanol for anode and 100 cc/min oxygen at 55 °C.

Maximum power density reduced to 78.2, 64.5, 55.9 and 41.8 % of the initial value after operation for 240, 432, 720 and 1176 h. X-ray diffraction results showed that the particle size of the PtRu catalysts increased while that of the Pt catalysts remained same. Dissolution of Ru was observed by energy dispersive spectroscopic study. Change of equivalent weight was also studied.