

Performance degradation study of direct methanol fuel cell consists of PtRu and Pt black catalysts

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Direct methanol fuel cell (DMFC) is widely studied as a portable power source with longer life time than lithium-ion batteries. Among the obstacles to be overcome for commercialization of DMFC, stability of catalysts is one of most important point, which determines the life time of DMFC. In the present study, performance degradation of membrane electrode assembly (MEA) with PtRu and Pt catalysts was shown with the change of catalysts. The MEAs were prepared by the decal transfer method. Catalyst loading was 2 mg/cm^2 for both the PtRu (anode) and Pt (cathode) catalysts. The prepared MEAs were operated at a constant current of 100 mA/cm^2 . Operation conditions were 1 ml/min 1 M methanol for anode and 100 cc/min oxygen at $55 \text{ }^\circ\text{C}$. Maximum power density decreased from 62.9 mW/cm^2 to 55.6 , 49.2 , 40.6 , 35.2 , 26.6 and 26.3 mW/cm^2 with operation time from 0 to 120, 240, 432, 720, 912 and 1176 hours. In XRD study, peak shift was observed in the PtRu catalyst, while no change was shown in the Pt catalyst. Particle size was calculated from the XRD results and agglomeration of the PtRu catalyst was observed, while no change was shown in the Pt catalyst.