Attenuated degradation of PEMFC cathode during fuel starvation by using carbon-supported IrO_2

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Catalyst degradation caused from carbon corrosion during fuel starvation operation has been considered to be one of the critical factors limiting the durability of polymer electrolyte membrane fuel cells (PEMFCs). In this work, we found that IrO_2, water electrolysis catalyst, is effective to prevent the corrosion of catalyst support. But it had controversial points in terms of cost and performance of PEMFC. To solve these problems, we synthesized carbon-supported iridium oxide, IrO_2/C
IrO_2 and IrO_2/C catalysts were added into the Pt/C commercial catalyst (40wt%, Johnson Mattey), respectively and the mixed catalysts were sprayed onto a GDL (10BC, Sigracet) to get the cathode. Investigations of the durability of mixed catalysts were carried out using a single cell test. Repetitive H_2/Air boundary in anode was artificially formed to create an environment that resembles actual fuel starvation of PEMFC. As a result, we confirmed that the single cell containing the water electrolysis catalysts leads to increase resistance for carbon oxidation. In addition, compared with IrO_2, carbon-supported IrO_2, IrO_2/C is more effective to maintain innate performance and improve durability of PEMFC.