

Hydrogen Oxidation Reaction Selective Anode For PEM Fuel Cells

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In polymer electrolyte membrane fuel cells (PEMFC), formation of H₂-air front during start-up / shutdown operation leads to high potential (~ 1.5 V – 1.8 V) vs. RHE) on the cathode electrode. During this operation, cathode catalyst layer undergoes Pt dissolution and carbon corrosion resulting in irreversible voltage losses. To improve durability at such operation, material solutions have largely focused on development of corrosion resistant graphitized carbon supports and non-carbon supports for improved resistance towards corrosion at high potential operation.

In the current work, use of hydrogen oxidation reaction (HOR) selective catalysts on the anode and its impact on cathode catalyst layer durability during start-up / shutdown operation is studied. HOR selective catalysts or poor oxygen reduction reaction catalysts such as palladium on carbon (Pd/C) and iridium on carbon (Ir/C) are used as model catalysts on the anode to demonstrate this approach. Improvement in durability in start-up/shutdown operation with the HOR selective catalysts and material challenges are discussed.