

Highly Durable Metal-Oxides as an Alternative Catalyst Supports for PEM Fuel Cells

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Catalyst material and the catalyst supports are crucial parts to maintain the durability in polymer electrolyte fuel cells (PEFCs). In general carbon is a common catalyst support material with high surface area and high electrical conductivity. However, low corrosion resistance of carbon limits the efficiency of the catalyst and produce research on alternative supports. Titanium sub-oxides, kind of ceramic materials, including Magnéli phase titanium oxides (MPTOs) with chemical formula ($\text{Ti}_n\text{O}_{2n-1}$) $4 \leq n < 7$ are promising catalyst support candidates with high conductivity and chemical stability for PEFC. However their low surface area ($1 \text{ m}^2 \text{ g}^{-1}$ or less) limits application in PEFCs. In this study, MPTOs with high surface area were prepared by high temperature reduction. Detailed characterizations including XRD, TEM and electrical conductivity were conducted in addition to electrochemical performance experiments. For further performance evaluation, membrane electrode assemblies (MEAs) prepared and single cell tests are planned to conduct.