

High-performance membrane-electrode assembly with an optimal polytetrafluoroethylene content for high-temperature polymer electrolyte membrane fuel cells - DTU Orbit (09/11/2017)

High-performance membrane-electrode assembly with an optimal polytetrafluoroethylene content for high-temperature polymer electrolyte membrane fuel cells

Although high-temperature polymer electrolyte membrane fuel cells (HT-PEMFCs) have a high carbon monoxide tolerance and allow for efficient water management, their practical applications are limited due to their lower performance than conventional low-temperature PEMFCs. Herein, we present a high-performance membrane-electrode assembly (MEA) with an optimal polytetrafluoroethylene (PTFE) content for HT-PEMFCs. Low or excess PTFE content in the electrode leads to an inefficient electrolyte distribution or severe catalyst agglomeration, respectively, which hinder the formation of triple phase boundaries in the electrodes and result in low performance. MEAs with PTFE content of 20 wt% have an optimal pore structure for the efficient formation of electrolyte/catalyst interfaces and gas channels, which leads to high cell performance of approximately 0.5 A cm^{-2} at 0.6 V.

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