

Inventions & Innovation Project Abstract

Higher Temperature Membrane and Electrode Assembly for Proton Exchange Membrane Fuel Cell Device Based on SPEKK Blends

Fuel cells represent a new “high-tech,” high-growth industry that will create domestic jobs in the assembly, distribution, and service sectors. It is critical that the United States establish a leading position in the develop of fuel cell technologies to ensure that our nation reaps the efficiency, employment, growth, and environmental benefits that this new industry will create.

Oxford Performance Materials (OPM) is developing a higher-temperature, lower-cost Membrane Electrode Assembly (MEA) for Proton Exchange Membrane Fuel Cells (PEMFC). The technology acts as a critical enabler of fuel cell commercialization by increasing system efficiency and reducing system costs. OPM’s objective is to replace Nafion® in the MEAs of PEMFCs with a higher-temperature, lower-cost blend of a polymer called Sulfonated PEKK (SPEKK). OPM has an ongoing collaboration with UCONN and has developed a novel proprietary ion-conductive polymer, SPEKK. SPEKK blends show Nafion®-level conductivity and also has outstanding thermal stability (~270°C). Preliminary MEAs, based on SPEKK membranes with Nafion impregnated catalyst layers, show excellent activity in H₂/air fuel cell tests. The critical task is to eliminate the Nafion® by developing SPEKK-based catalyst layers. The invention will enable net system efficiency improvements of 6-10% and system cost reductions of \$375/kW.



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