

119j Nanoporous Silicon Electrode Structures for Micro-Fuel Cell Applications

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Silicon-based microscale fuel cells are under active development to supply chip-scale electrical power. One of the key challenges in fabrication of such fuel cells is the fabrication of the membrane electrode assembly. Nanoporous silicon has previously been demonstrated as a viable proton conducting membrane material in microscale direct formic acid fuel cells. In this work, we have demonstrated the use of nanoporous silicon as a structural electrode material for microscale direct formic acid fuel cells (DFAFCs) and characterized key performance metrics. The nanoporous silicon provided an excellent high surface area catalyst support that is compatible with standard microfabrication processes. The applicability of nanoporous silicon for this purpose was demonstrated in a simple DFAFC.