

MECHANICS OF COMPOSITE MATERIALS IN FUEL CELL SYSTEMS

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The science and technology that are fundamental to the concept of composite materials are also the foundation for the construction and function of fuel cells and fuel cell systems. The present paper outlines this relationship in the context of the physics and chemistry that are enabled by the specific selection and arrangement of constituents of the “functional composite” fuel cell. General principles of operation are described, and fundamental issues are defined that must be addressed by the composites community if the fuel cell science and engineering is to advance. Examples of several types of functional composite fuel cells are presented, with emphasis on polymer electrolyte (PEM) and solid-oxide (SOFC) systems. Specific needs for continued research are identified.