Chemical Vapor Infiltration Modeling and Processing of Energy-Related Materials

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Chemical vapor infiltration (CVI) is emerging as a technology for fabricating fiber-reinforced composite materials. The technique utilizes the chemical vapor deposition process in which a precursor gas stream reacts on the internal surfaces of a porous body at elevated temperatures to deposit matrix material. The method allows high temperature phases to be produced at temperatures well below their melting point and with minimal stress so as to preserve the often less tolerant reinforcement. The interrelated thermal, mass transport, and kinetic processes have been modeled to allow for optimization of infiltration and, most recently, prototypical silicon carbide matrix heat exchanger tubes have been prepared. The CVI process has also been used to produce carbon composite proton exchange membrane fuel cell bipolar plates for automotive propulsion applications.

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