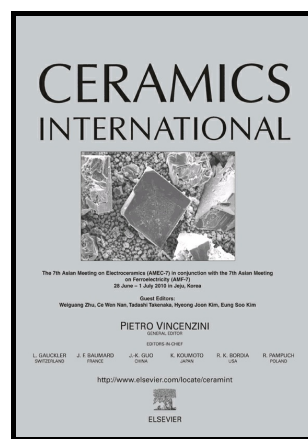


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Effect of pyrolysis temperature on the microstructure and capillary infiltration behavior of carbon/carbon composites

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Abstract: Carbon fiber fabric reinforced plastics were pyrolyzed at temperatures between 900 °C and 1600 °C to convert them into carbon/carbon (C/C) composites. The effects of pyrolysis temperatures on the microstructure, mechanical properties, and especially on the capillary infiltration behavior of C/C composites, suitable for liquid silicon infiltration (LSI), were investigated. The porosity of these C/C composites shows a decreasing trend with increasing pyrolysis temperature. The established model can explain the pyrolysis mechanism and the infiltration behaviors. Within the initial stage, the capillary infiltration rate of C/C composites with the model fluid water increases rapidly. In the second stage, where thermal imaging indicates that water has reached the top area of the plates at the initial stage. Capillary infiltration rate, based on water infiltration experiments mass increase, decreases because the shrinkage of micro-delamination takes place at higher pyrolysis temperature. In combination with LSI results, a model for the capillary infiltration behavior of C/C is proposed.

Keywords: Pyrolysis; C/C composites; capillary infiltration; Microstructure; LSI

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