

***In situ* and *ex situ* characterizations of C/C composites prepared under high pressure and high temperature conditions**

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Abstract

C/C Composites are commonly used for aeronautic and aerospace industries. We present an unconventional technique based on the supercritical fluid technology for manufacturing dense ceramic matrix composites: Supercritical Fluid Chemical Infiltration (SFCIn). The infiltration of a carbon fibrous preform by means of a hydrocarbon in the supercritical fluid state is carried out at high temperature in order to get a carbon matrix. The selected hydrocarbon for this study is methane (CH₄). In this work, we detail *in situ* and *ex situ* investigations of materials prepared under extreme conditions to fabricate C/C composites. The characterization of carbon materials was performed by optical microscopy, with polarized light and Raman spectroscopy whereas the analysis of the fluid phase was conducted by micro-gas chromatography. The as-obtained pyC matrix display a high anisotropy of the graphite layers.