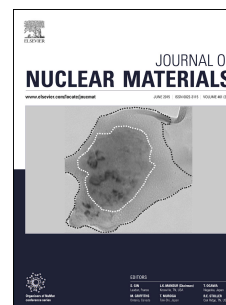


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# Effects of sintering additives on the microstructural and mechanical properties of the ion-irradiated SiC<sub>f</sub>/SiC

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## Abstract

SiC<sub>f</sub>/SiC composites containing three different types of sintering additives *viz.* Sc-nitrate, Al<sub>2</sub>O<sub>3</sub>-Sc<sub>2</sub>O<sub>3</sub>, and Al<sub>2</sub>O<sub>3</sub>-Y<sub>2</sub>O<sub>3</sub>, were subjected to ion irradiation using 0.2 MeV H<sup>+</sup> ions with a fluence of 3×10<sup>20</sup> ions/m<sup>2</sup> at room temperature. Although all composites showed volumetric swelling upon ion irradiation, SiC<sub>f</sub>/SiC with Sc-nitrate showed the smallest change followed by those with the Al<sub>2</sub>O<sub>3</sub>-Sc<sub>2</sub>O<sub>3</sub> and Al<sub>2</sub>O<sub>3</sub>-Y<sub>2</sub>O<sub>3</sub> additives. In particular, SiC<sub>f</sub>/SiC containing the conventional Al<sub>2</sub>O<sub>3</sub>-Y<sub>2</sub>O<sub>3</sub> additive revealed significant microstructural changes, such as surface roughening and the formation of cracks and voids, resulting in reduced fiber pullout upon irradiation. On the other hand, the SiC<sub>f</sub>/SiC with Sc-nitrate showed the highest resistance against ion irradiation without showing any macroscopic changes in surface morphology and mechanical strength, indicating the importance of the sintering additive in NITE-based SiC<sub>f</sub>/SiC for nuclear structural applications.

**Keywords:** SiC<sub>f</sub>/SiC; EPD; Irradiation; Flexural strength; Volumetric swelling

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