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Authors: Shun Dong, Xinghong Zhang, Dongyang Zhang, Boqian Sun, Liwen Yan, Xiaoguang Luo



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Strong effect of atmosphere on the microstructure and microwave absorption properties of porous SiC ceramics

Shun Dong^{1,*}, Xinghong Zhang^{1,*}, Dongyang Zhang¹, Boqian Sun¹, Liwen Yan¹, Xiaoguang Luo²

¹Science and Technology on Advanced Composites in Special Environment Laboratory, Harbin Institute of Technology, Harbin 150001, PR China

²The Institute of Theoretical and Applied Aerodynamics, China Academy of Aerospace Aerodynamics, Beijing 100074, PR China

^{1*}*Corresponding author: Tel/fax: +86 451 86403016.*

E-mail address: dongshunhit88@163.com (S. Dong)

Abstract:

Excellent microwave absorption properties of porous SiC ceramics were successfully synthesized using SiC/camphene slurries with various polycarbosilane (PCS) contents related to the SiC powder. The compositions of the nanowires (NWs) growth in the pore channels of porous SiC ceramics strongly depended on the pyrolysis atmosphere, with N₂-generating Si₃N₄ NWs and Ar SiC NWs. With the increase of PCS content, the minimum reflection coefficient (RC) of porous SiC ceramics decreased from -7.6 dB to -67.4 dB in Ar and from -10.9 dB to -24.7 dB in N₂, respectively. The effective absorption bandwidth (EAB) of porous SiC ceramics could be up to 8.1 GHz in Ar and 4.5 GHz in N₂. The enhanced microwave absorption properties of porous SiC ceramics could be attributed to the formation of SiC nano-crystalline, nanosized carbon and the NWs, which would increase the amount of boundaries and defects, leading to the electronic dipole polarization and interfacial scattering.

¹**Keywords:** Atmosphere; SiC; Nanowires; Porous; Microwave absorption property.

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