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

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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 N_2-generating Si_3N_4 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 N_2, respectively. The effective absorption bandwidth (EAB) of porous SiC ceramics could be up to 8.1 GHz in Ar and 4.5 GHz in N_2. 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.