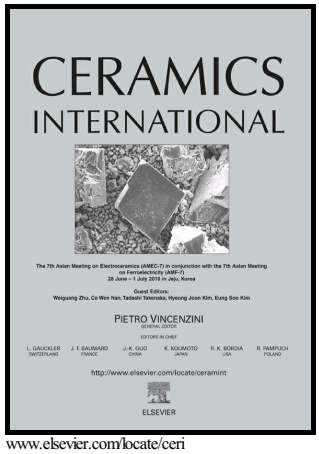

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Microstructures, dielectric response and microwave absorption properties of polycarbosilane derived SiC powders

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Abstract:

Carbon-rich SiC powders with high dielectric loss were prepared via pyrolysis of polycarbosilane (PCS). The effects of pyrolysis temperature on microstructures, dielectric response and microwave absorption properties in X-band (8.2-12.4 GHz) of PCS-derived SiC powders were investigated. The PCS-derived SiC powders are mainly composed of SiC nanocrystal, turbostratic carbon and amorphous phase (SiC and/or C). The size of SiC nanocrystals and the graphitization degree of carbon both increase with the elevation of pyrolysis temperature. Furthermore, the residual carbon is transformed from amorphous into turbostratic structure with a phenomenon of regional enrichment. Moreover, the relative complex permittivity increases notably with the higher pyrolysis temperature. Meanwhile, the dielectric loss tangent increases from 0.19 to 0.57, while the microwave impedance decreases from 73.20 to 53.58. The optimal reflection loss of -35 dB for PCS-derived SiC powders is obtained when the pyrolysis temperature is 1500 °C, which exhibits a great application prospect in microwave absorbing materials.

Keywords: Polymer derived ceramics; Polycarbosilane; SiC powder; Dielectric property; Microwave absorption properties;