

High Strength and High Temperature Resistance TiC Ceramic

Aerogel

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Abstract: At present, SiO₂ aerogel has been industrialized and applied in engineering. However, due to the characteristics of low density and high porosity, SiO₂ aerogel has poor mechanical properties, specifically manifested as low strength, high brittleness, powder dropping and other problems. TiC has the advantages of high melting point, high hardness, wear resistance, corrosion resistance, oxidation resistance. The preparation of porous and lightweight TiC ceramic aerogel by sol-gel process can effectively improve the strength and hardness compared to conventional aerogels. By the sol-gel method, mixing RF sol and TiO₂ sol, after gelation, solvent exchange and supercritical drying processes to get monolithic RF/TiO₂ aerogels, carbon thermal reduction was carried out at different temperatures to form different components and contents of TiC ceramic aerogels. By calculating the Gibbs free energy of the reaction, the sequence of the reaction was discussed and the reaction mechanism was studied. Characterization methods such as XRD, FT-IR, TEM, SEM, XPS and NMR were used.

Keywords: aerogels; TiC ceramic aerogel; TiC cements; nanostructure

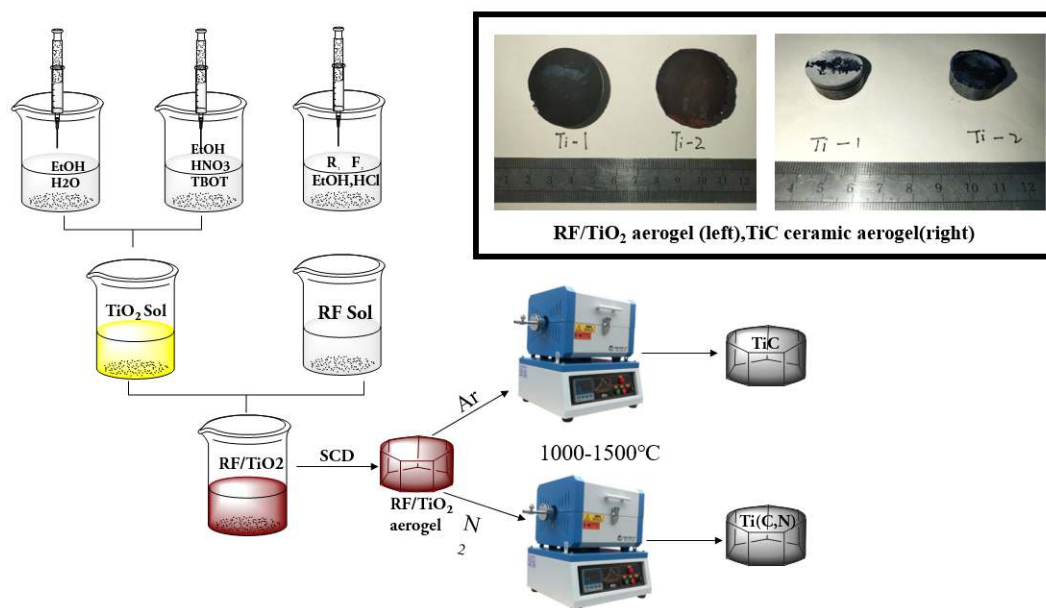


Fig.1 the preparation process of TiC ceramic aerogels

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