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Supplementary Information

Single-Source-Precursor Synthesis of Dense SiC/HfC_xN_{1-x}-Based Ultrahigh-Temperature Ceramic Nanocomposite

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Raman Spectroscopy Characterization of SiHfCN-based ceramics

The Raman spectra of the ceramics pyrolyzed at 1100◦C and annealed at different temperature reveal the presence of segregated carbon at all temperatures (Figure S1). In the Raman spectra of SiHfCN-based ceramics, the bands at 1350 cm^{-1} and 2700 cm^{-1} were assigned to the disorder-induced D band and 2D band (overtone of the D band, also named G' band) respectively, and the band at 1582 cm^{-1} assigned to the G mode representing the stretching vibrations of sp^2 carbon in the basal-plane of graphite.[1] The band appearing at 796cm^{-1} after annealing at temperatures higher than 1500 °C is the transverse optical (TO) phonon mode of β-SiC.[2] At temperatures lower than 1300 °C, the D and G bands are broad and overlapped due to the high disorder of the segregated carbon phase.[3] With the increasing of annealing temperature from 1400 ◦C to 1800 ◦C, the D and G bands become sharper, and

the intensity of 2D (G') bands grows gradually indicating that the ordering of the segregated carbon phase increases. However, the high intensity of the D band in all recorded spectra indicates in all samples that the carbon phase should be considered as being highly disordered / turbostratic in its nature.

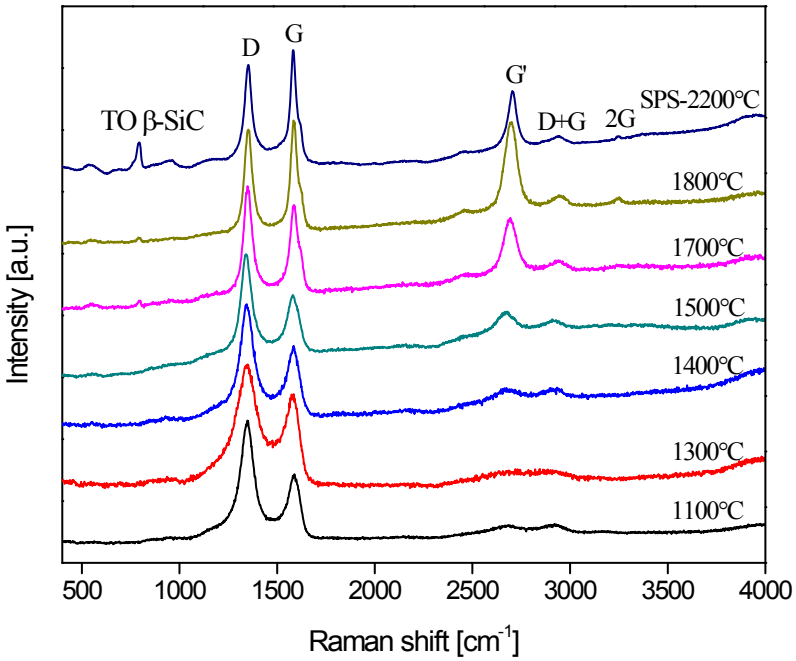

Figure S1 Raman spectra of SiHfCN-based ceramics annealed at different temperatures.

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