

## Hot-pressed ultra-high creep resistant silicon carbide ceramics

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Freeze-granulated and afterwards under infrared lamp annealed silicon carbide powder was densified to the full density without any sintering aids by hot-pressing/ultra-rapid hot-pressing at 1850 °C. This densification temperature is at least 150-200 °C lower compared to the up to now known solid state sintered silicon carbide powders. Presented silicon carbide hot-pressed ceramics have excellent mechanical properties. Samples densified by ultra-rapid hot-pressing have also full density and hardness of 27.4 GPa. Partial phase transformation beta/alpha - SiC was observed in the granulated and hot-pressed/rapid hot-pressed samples.

Creep rate of rapid hot-pressed samples at 1450 °C and 100 MPa load in 4-point bending test is  $3.8 \times 10^{-9} \text{ s}^{-1}$  and at 1400 °C and the same load conditions is  $9.9 \times 10^{-10} \text{ s}^{-1}$ .

Creep rate of the same at load of 400 MPa and temperature of 1750 °C at a compression mode was only  $10^{-7} \text{ s}^{-1}$ . This is the lowest creep rate of SiC at such conditions found in the literature. Enhanced beta/alpha SiC phase transformation was observed after the creep test. The oxidation behaviour of this way prepared SiC ceramics at 1350-1450°C/0-204h was investigated. This way prepared SiC ceramics is characterised by an high oxidation resistance ( $4.91 \times 10^{-5} \text{ mg}^2/\text{cm}^4\text{h}$  at 1450°C).