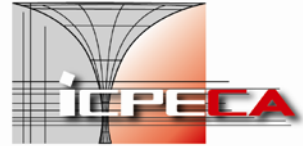




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NON-OXIDE CERAMIC MATERIAL WITH MECHANICAL RESISTENCE FOR INDUSTRIAL APPLICATIONS IN HEAVY WORKING CONDITIONS

Description:

Silicon Nitride (Si_3N_4)-based ceramic composite with varying proportions of Silicon Carbide (SiC), Yttrium Oxide (Y_2O_3) and Aluminium Oxide (Al_2O_3) additives. These ceramic materials based on Si_3N_4 and SiC are highly strength materials even at high temperatures; also, they are resistant to oxidation, use, corrosion and thermal shock, they possess high thermal conductivity, very low thermal expansion and good tribological properties.

Technical characteristics:

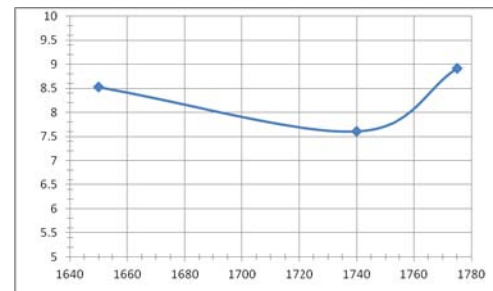
- sintering temperature in SPS,
 $T_{\text{sint}} = 1850^\circ\text{C}$;
- density, $\rho = 3,0 - 3,14 \text{ (g/cm}^3\text{)}$;
- mode of elasticity, $E = 290 \text{ GPa}$;
- Vickers hardness, $H_v = 16-20 \text{ GPa}$;
- tensile strength, $\sigma = 1,7 - 2,0 \text{ MPa}\cdot\text{m}^{1/2}$.



Samples of $\text{Si}_3\text{N}_4 + \text{SiC}$ sintered at SPS

Advantages:

Special properties that offer increased mechanical strength and resistance to use. These materials may be a good alternative to the aluminum or zirconia materials, having a mechanical strength comparable to alumina.



Variation of bending strength with sintering temperature

Application:

To be used in the military field for ballistic protection for tanks, vehicles, planes and helicopters.

Product protected by the patent:

Albu Florentina Marilena, Tsakiris Violeta, Tardei Christu, Seitan Cristian, *Method for obtaining ceramic plate made of $\text{Si}_3\text{N}_4 / \text{SiC}$ composite materials*, granted patent no. 128196, decision no. 4/57 of 28.02.2017