Comparison between ceramic material properties

Physical properties

	OXIDES				CARBIDE	NITRIDE		
	Al_2O_3	ZrO_2/Y_2O_3	ZrO_2/MgO	MgO	SiC	Si_3N_4 Reaction sintered	Si_3N_4 Hot pressed	ALN
Density (g/cm3)	3,9	5,9	5,75	3,58	3,2	3,27	3,29	3,26
Molecular weight (g/mole)	102	-	-	40,4	40,1	140	140	41
Maximum service temperature air (°C)	1700-1800	1500	1000	2200	1500	1200-1500	1100-1600	1000-1800

Mechanical properties

	OXIDES				CARBIDE	NITRIDE		
	Al_2O_3	ZrO_2/Y_2O_3	ZrO_2/MgO	MgO	SiC	Si_3N_4 Reaction sintered	Si_3N_4 Hot pressed	ALN
Hardness (Mohs)	9	-	-	5,5	9	-	-	7
Modulus of elasticity (GPa) -E-	300-400	200	200	250-300	420	170-220	280-310	318
Poisson's ratio -v-	0,25	-	-	0,18	0,14	0,25-0,26	0,27	0,25
Fracture toughness (MPa.m1/2) -K1c-	2 - 3	7 - 13	6 - 10	-	2,5-3,5	3,5-5	6,1	4,5

Electrical properties

	OXIDES				CARBIDE	NITRIDE		
	Al_2O_3	ZrO_2/Y_2O_3	ZrO_2/MgO	MgO	SiC	Si_3N_4 Reaction sintered	Si_3N_4 Hot pressed	ALN
Dielectric constant -εr-	9-10	-	-	9-10	-	10	10	9,2
Electrical resistivity at 20°C (Ohm.cm) -σ-	$>10^{14}$	10^{13}-10^{14}	$>10^{10}$	-	10^{2}-10^{6}	$>10^{7}$	10^{12}-10^{15}	$>10^{14}$
Dielectric strength (kV/mm)	10-20	9	2-10	-	-	-	-	15

Thermal properties

	OXIDES				CARBIDE	NITRIDE		
	Al_2O_3	ZrO_2/Y_2O_3	ZrO_2/MgO	MgO	SiC	Si_3N_4 Reaction sintered	Si_3N_4 Hot pressed	ALN
Specific heat (J/K/kg)	900	400-500	420	870-880	750	690	680-800	800
Thermal conductivity (W/m/K) at 20°C -λ-	26-35	2,2-3,2	1,5-2,5	40-50	63-155	9-30	15-43	180
Coefficient of thermal expansion (10-6) from 20 to 1000°C -α-	8-9	10-11	5-16	10-13	4-5	3	3,3	4,4-5,3
Melting point (°C)	2050	2590	-	2800	2500	1900	1900	2200