Materials characteristics

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		Material	Alumina 96%	Alumina 99.7%	Alumina 99.9%	ZTA $90\%Al_2O_3$ / 10% 3Y-TZP	Ce-Y stabilised Zirconia 85% TZP / 15% Al_2O_3	ATZ 80% 3Y-TZP / 20% Al_2O_3	Zirconia 3Y-TZP	Zirconia 1.5Y-TZP	Zirconia Mg-PSZ	Zirconia Ce-TZP	Sapphire/ruby	Silicon Carbide sSiC	Silicon nitride Si_3N_4-Y_2O_3	SiAlON	Aluminum Nitride AlN	Alumina 99.9%	Zirconia 3Y-TZP	ATZ 80% 3Y-TZP / 20% Al_2O_3	Polycristalline Ruby
		Units																HIP	HIP	HIP	HIP
General																					
	density	$g.cm^{-3}$	3.75	3.85	3.95	4.13	5.70	5.40	6.06	6.10	5.74	6.2	3.99	3.1	3.21	3.24	3.20	3.97	6.07	5.43	3.99
	water adsorption	%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Gas permeability	%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Color	-	white	Ivory	Ivoiry-white	white	brown	white	white/black	white	Orange	light yellow	transparent/red	black	Grey			translucent	white	white	Rubis
	Structure	-	Polycristal	Polycristal	Polycristal	Polycristal	Polycristal	Polycristal	Polycristal	Polycristal	Polycristal	Polycristal	Monocristal	Polycristal	Polycristal	Polycristal	Polycristal	Polycristal	Polycristal	Polycristal	Polycristal
	Average Grain size	µm	4±1	4±2	3±1	3±1	0.5±0.1	0.5±0.1	0.5±0.1	0.2±0.1	20±5	1±0.5	-	-	-			3±1	0.5±0.1	0.5±0.1	3±1
Mechanical																					
	Bending strenght 20°C	MPa	300	400	500	600	1000	1000	1200	1100	400	600	200	400	850	750	350	550	1700	1600	600
	Weibull modulus	-	13	14	15	17	15	15	10	15	25	10		12	16	10		16	18	15	
	Compression strenght	MPa	2500	3500	4000	4000	2500	2500	2200	2000	1600	2000	2000	2000	3000			4000	2200	2500	4000
	K1c	$MPa.m^{1/2}$	4	4	4	5	12	5	8	15	8	8		4	7	5.5	3	5	9	5	4
	Young modulus	GPa	350	400	400	380	250	250	210	210	210	200	400	400	300	350	300	400	210	250	400
	Poisson ratio	-	0.23	0.23	0.23	0.25	0.26	0.26	0.3	0.3	0.3	0.25		0.15	0.25	0.25	0.25	0.23	0.3	0.26	0.23
	Hardness Vickers	Hv	1500	1700	1900	1800	1200	1400	1200	1200	1200	800	2000	2200	1600	1800		1900	1300	1400	2000
Thermal																					
	Conductivity 20°C	$W.m^{-1}.k^{-1}$	20	25	30	20		10	2.5	2.5	3	3.5		100	20	20	170	30	2.5	10	30
	conductivity 1000°C	$W.m^{-1}.k^{-1}$																			
	Linear thermal expansion coefficient																				
	20-100°C	$10^{-6}.k^{-1}$																			
	20-400°C	$10^{-6}.k^{-1}$	7.6	7.5	7.5	8		9	10	10	10	9	6	3.5	3.2	3.3	5	7.5	10	9	7.5
	20-600°C	$10^{-6}.k^{-1}$																			
	20-1000°C	$10^{-6}.k^{-1}$	8.8	8.7	8.5				11.7	11.7	11	10		5	4.3			8.5	11.7		8.5
	Specific heat 20°C	$kJ.kg^{-1}.k^{-1}$	0.9	0.9	0.9	0.9		0.5	0.4	0.4	0.4		0.4	0.6	0.7	0.7	0.8	0.9	0.4	0.5	0.9
	Temperature max																				
	oxygen	°C	1200	1500	1500	1000	1000	1000	1000	1000	850	500	1500	1400	1300	1000	800	1500	1000	1000	1000
	inert	°C	1200	1500	1500	1000	1000	1000	1000	1000	850	500	1500	1800	1600			1500	1000	1000	1000
Electrical																					
	Resistivity 25°C	Ω.cm	1.10^{15}	1.10^{14}	5.10^{14}	1.10^{14}			1.10^{12}	1.10^{12}	5.10^{12}	1.10^{13}	1.10^{9}	5.10^{7}	1.10^{14}		1.10^{12}	5.10^{14}	1.10^{12}		
	Résistivity 400°C	Ω.cm	1.10^{8}	5.10^{8}	5.10^{8}	1.10^{9}			1.10^{4}	1.10^{4}	1.10^{5}	1.10^{6}		1.10^{1}	1.10^{10}			5.10^{8}	1.10^{4}		
	Dielectric strength	$kV.mm^{-1}$	17	18	19				19	19	19	25		0	19		30	19	19		
	Dielectric constant	-	8 (1MHz)	9 (1MHz)	9 (1MHz)	10 (1MHz)			29 (1MHz)	29 (1MHz)	27 (1MHz)	30 (1MHz)			8 (1MHz)	9	9 (1MHz)	9 (1MHz)	29 (1MHz)		
	tan δ	-	5.10^{-3} (9GHz)	5.10^{-3} (9GHz)	5.10^{-3} (9GHz)				2.10^{-3} (1GHz)	2.10^{-3} (1GHz)	2.10^{-3} (1GHz)	1.10^{-3} (1MHz)			4.10^{-3} (1GHz)	1.10^{-3}	5.10^{-3} (9GHz)	5.10^{-3} (9GHz)	2.10^{-3} (1GHz)		
Note							Shock resistant														

Ceramics properties can differ based on specific manufacturing routes.
The following table provides information for material selection, showcasing typical values for different ceramic families.
The data presented are derived from internal measurements and literature, and should not be regarded as specifications