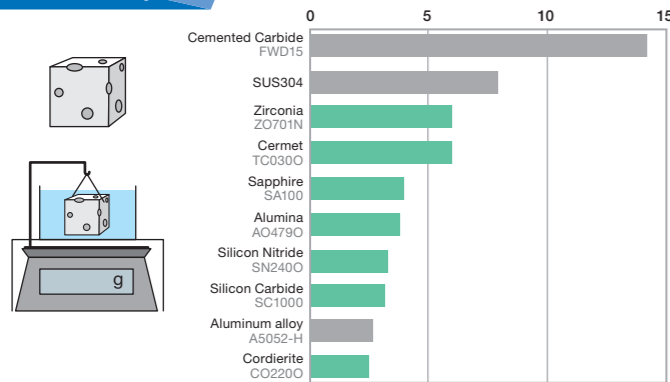


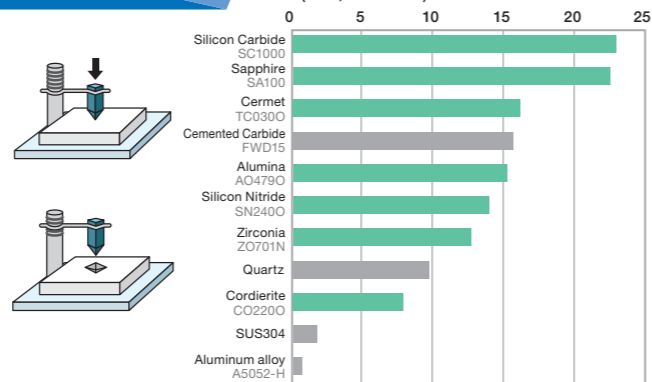
Characteristics of Fine Ceramics

Characteristics of Fine Ceramics

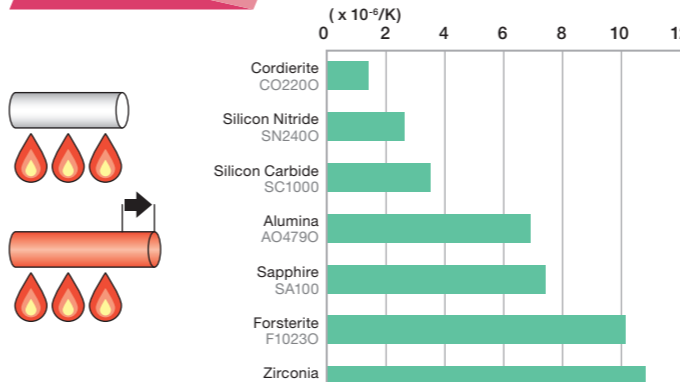
Density



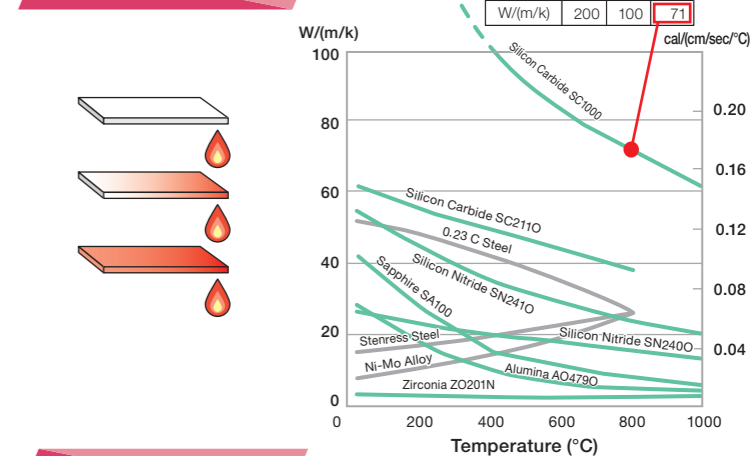
Hardness



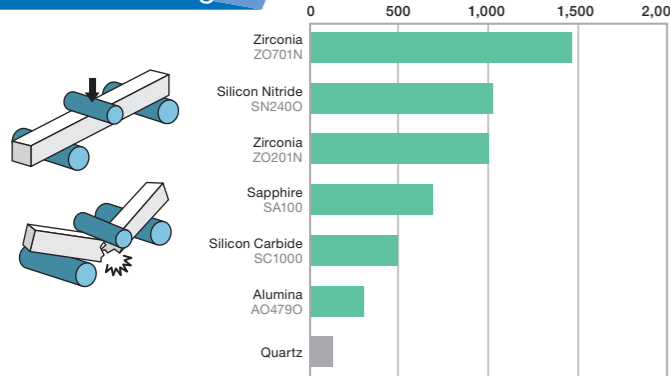
Thermal Expansion



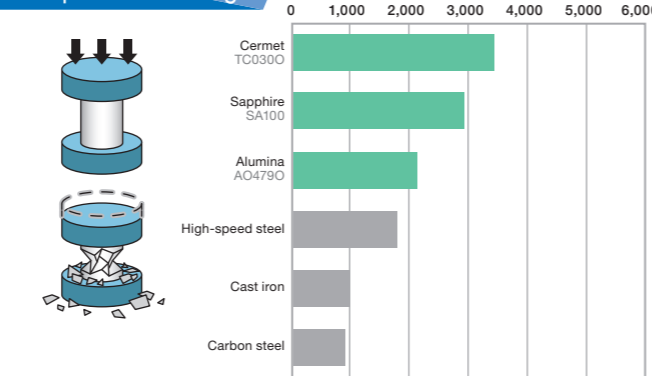
Thermal Conductivity



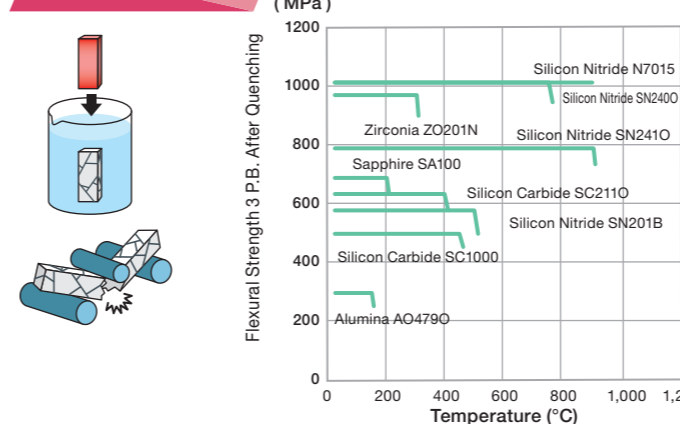
Flexural Strength



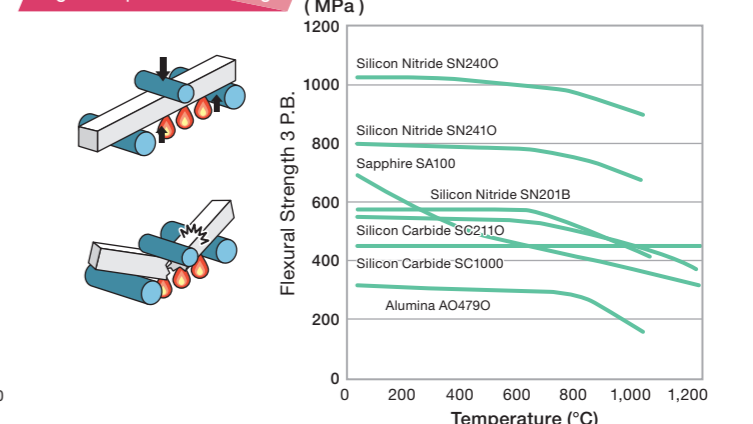
Compressive Strength



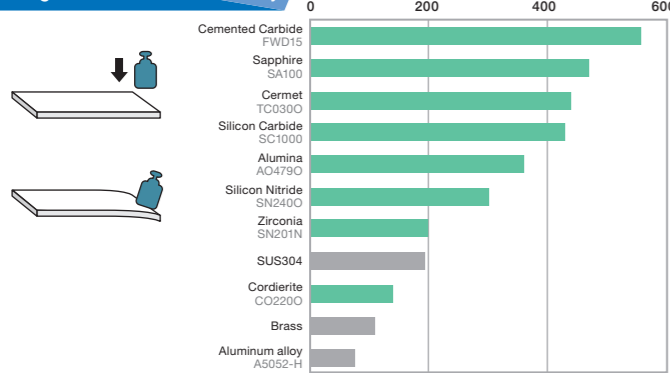
Heat Shock Resistance



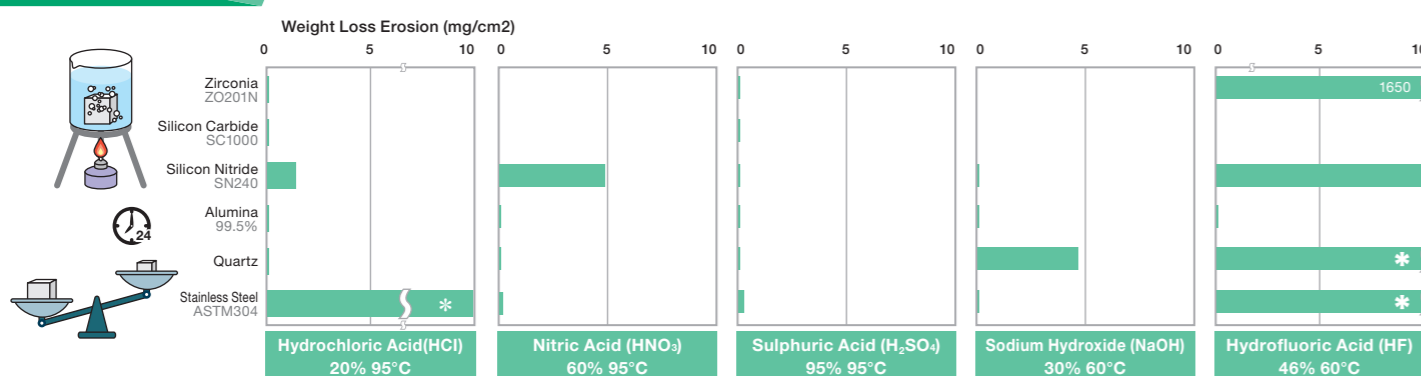
High-Temperature Strength



Young's Modulus of Elasticity

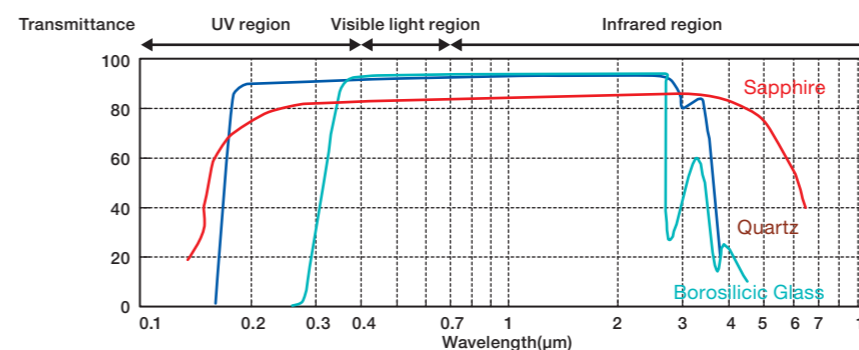


Chemical Resistance

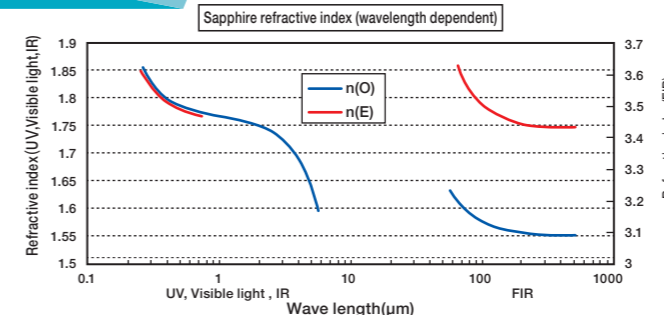


Single-Crystal Sapphire

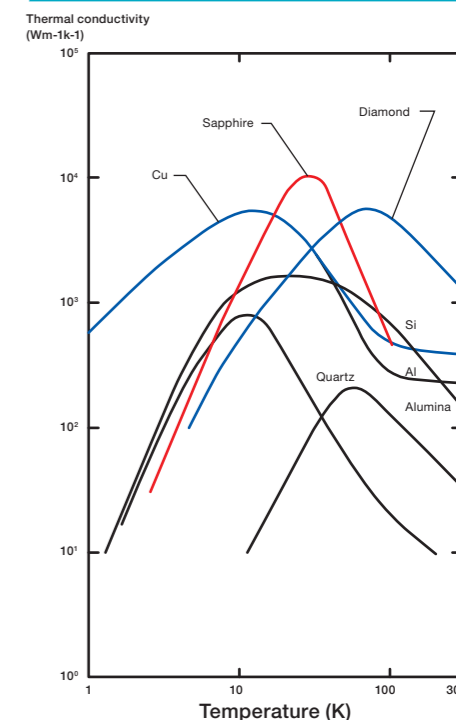
Transmittance



Optical Refractive Index



Low Temperature Thermal Conductivity



*Cannot be measured due to excessive erosion

*Cannot be measured due to excessive erosion

*According to our research.

*Reference: NASA (Proceedings of the Cold Electronics Workshop)

Characteristic Table of Fine Ceramics



Item	Material	CORDIERITE (2MgO · 2Al ₂ O ₃ · 5SiO ₂)		STEATITE (MgO · SiO ₂)	FORSTERITE (2MgO · SiO ₂)	TITANIA	CERMET		SILICON CARBIDE (SiC)				SILICON NITRIDE (Si ₃ N ₄)			ALUMINIUM NITRIDE (AlN)		KFGP			KFSG				
		CO2200	CO7200	SO2100	F11200	TO7160	TC0300	GO1020	SC1200	SC121P	SC2110	SC1000	SN201B	SN2400	SN2410	AN216A	AN2000	ALUMINUM TITANATE (Al ₂ TiO ₃)	SILICON CARBIDE (SiC)	SILICON NITRIDE (Si ₃ N ₄)	ALUMINIUM (Al ₂ O ₃)	ZIRCONIA (ZrO ₂ -Mg- PSZ-1)			
Material Code (New)		CO2200	CO7200	SO2100	F11200	TO7160	TC0300	GO1020	SC1200	SC121P	SC2110	SC1000	SN201B	SN2400	SN2410	AN216A	AN2000	AT	SiSiC	N7015	F99.7	FZM			
Material Code (Old)		CO220	CO720	S210	F1120	T716	TC30	G102	SC120	SC121	SC211	SC1000	SN201B	SN240	SN241	AN216A	AN2000								
Appearance		Dense		Dense	Dense	Dense	Dense		Dense	Porous	Dense		Dense			Dense		POROUS	Dense	Dense	Dense	Dense			
Color		Gray	Gray	White	Light Yellow	Light Brown	Silver		Black	Black	Black	Black	Black	Black	Black	Gray	Ivory	White/Gray	Black	Black	Ivory	Dark yellow			
Content (%)		-	-	-	-	-	-		-	-	-	-	-	-	-	-	AlN 99.9	-	-	-	-	-			
Main Characteristics		•Very Low Thermal Expansion •Light Weight •Void Less		•Good Insulation Property	•Excellent Surface Finish	•Excellent Surface Finish •CaTiO ₃	•High Mechanical Strength •Excellent Wear Resistance •High Heat Shock Resistance •Electrical Conductivity •Nonmagnetic		•High Temperature Strength •High Corrosion Resistance •Excellent Thermal Conductivity •Light Weight and High Stiffness •Good Surface Smoothness				•High Temperature Strength •High Corrosion Resistance •Wear Resistance •Excellent Thermal Conductivity •Light Weight and High Stiffness •High Toughness •High Corrosion Resistance		•High Temperature Strength •Wear Resistance •Excellent Thermal Shock Resistance •Light Weight •High Strength, High Temperature Durability •Thermal Conductivity			•Insulation Property •High Thermal Conductivity •Lower Thermal Expansion •High Purity •Good Plasma Resistance		•Heat Shock Resistance •Thermal Insulation	•Including Si •Very High Thermal Conductivity •Light Weight •High Stiffness •Less Voids	•High-Temperature Strength •Wear Resistance •Heat Shock Resistance •Light Weight	•High Purity •High Corrosion Resistance •High Heat Resistance	•High Mechanical Strength •High Toughness •Excellent Surface Finish	
Main Applications		•Lithography Stage Component •Wafer Inspection Stage Component •SEM/TEM		•Various Circuit Parts	•Substrate For Resistor •Core For Resistor	•Substrate •Slider Pads for Disk Drive Heads	•Cutting Tool Tips •Wear Resistant Parts •Metal Forming Tools		•Watch Parts •Wear Resistant Parts		•Mechanical Seal •Sliding Parts •High Temperature Resistance Parts •Pulverizer •Semiconductor Processing Equipment				•Anti Wear Liner •Pulverizer •Molten Metal Parts •Metal Forming Tool			•Heat Uniformity Parts •High-Temperature Treatment Fixtures •Semiconductor Processing Equipment		•Molten Aluminum	•Semiconductor Processing Equipment •Mechanical Seals	•Anti Wear Liner •Pulverizer •Molten Metal Parts •Metal Forming Tool	•Corrosion Resistant Parts •Heat Resistant Parts •Semiconductor Processing Equipment	•Pump Parts •Wire Drawing Machine Parts •Pressure Sensors	
Density (* 1)	g/cm ³	JIS R 1634	2.50	2.54	2.8	3.0	3.9	6.0	5.4	3.15	3.1	3.2	3.16	3.2	3.3	3.2	3.4	3.2	3.4(* 1)	3.05	3.2	3.93	5.76		
Water Absorption	%	JIS C 2141	0	0	0	0	0	0	0	0	0.01	0	0	0	0	0	0	0	1.2	0	0	0	0		
Mechanical Characteristics	Vickers Hardness HV9.807N	GPa	JIS R 1610	8.0	8.5	5.8	7.3	8.5	15.7	18.4	23.0	22.0	22.0	23.0	13.9	14.0	13.8	10.4	11.2	3.2	22	14.2	17	10.0	
	Flexural Strength 3 P.B.	MPa	JIS R 1601	190	200	190	180	320	1,810	1,290	500	296	600	500	580	1,020	790	310	220	30	350	1,020	400	605	
	Compressive Strength	MPa	JIS R 1608	1,800	1,923	1,305	-	1,160	3,430	-	4,300	3,064	4,200	4,200	3,160	3,551	3,292	3,200	2,900	230	2,300	3,880	2,500	2,012	
	Young's Modulus of Elasticity	GPa	JIS R 1602	140	145	120	150	260	430	440	430	410	430	440	290	300	290	320	310	30	380	300	388	207	
	Poisson's Ratio	-		0.31	0.31	0.22	0.24	0.26	0.22	0.22	0.16	0.16	0.16	0.17	0.28	0.28	0.28	0.24	0.24	-	0.18	0.3	0.24	0.31	
	Fracture Toughness (SEPB)	MPa · m ^{1/2}	JIS R 1607	1~1.5	1~1.5	1.9	1.8	1.8	7.6	5.7	2.5	2.3	4~5	2~3	4~5	7	6~7	3.2	2.5	-	3	5.7	5	8.5	
Thermal Characteristics	Coefficient of Linear Thermal Expansion	40-400°C	×10 ⁻⁶ /K	JIS R 1618	1.5 (40°C-400°C)	1.5 (40°C-400°C)	7.7	9.7	11.5	7.6	7.1	3.7	3.6	3.7	3.7	2.4	2.8	2.9	4.6	4.6	0.0	3.5	2.4	7.0	10.2
					2.1 (40°C-800°C)	2.1 (40°C-800°C)	8.0	10.8	12.1	8.5	8.2	4.4	4.3	4.4	4.4	3.2	3.3	3.5	5.3	5.2	0.7	4.2	3.0	8.0	10.6
	Thermal Conductivity 20°C	W/(m · K)	JIS R 1611	4	4	2	5	4	17	14	190	190	60	200	25	27	54	150	67	2	185	20	33	3.5	
				Specific Heat Capacity	J/(g · K)	JIS R 1611	0.71	0.74	0.75	0.78	0.71	-	-	0.67	0.70	0.67	0.67	0.64	0.65	0.66	0.71	0.72	0.80	0.70	0.63
Thermal Shock Temperature Difference (Put in Water,Relative Method)	°C	JIS R 1648	450	400	150	-	150	310	-	300	250	400	350	550	800	900	250	200	-	350	>900	180	250		
Electrical Characteristics	Dielectric Strength	kV/mm	JIS C 2141	19.1	19.3	18	17	6.8	-	-	-	-	-	9.7	13	12	14	16	10	-	13.2	-	-		
	Volume Resistivity	20°C		>10 ¹⁴	>10 ¹⁴	>10 ¹⁴	>10 ¹⁴	10 ¹²	10 ⁻⁴	10 ⁻⁴	10 ⁶	>10 ⁶	10 ⁵	10 ⁸	>10 ¹⁴	>10 ¹⁴	>10 ¹⁴	>10 ¹⁴	>10 ¹⁴	>10 ⁸	>10 ³	>10 ¹⁴	-	-	
		300°C		10 ¹²	10 ¹²	10 ¹⁰	10 ¹³	10 ¹⁰	-	-	10 ⁴	10 ⁵	10 ⁴	10 ⁴	10 ¹²	10 ¹²	10 ¹²	10 ¹⁰	10 ¹¹	-	-	10 ¹³	-	-	
		500°C		10 ¹⁰	10 ¹⁰	10 ⁷	10 ¹⁰	10 ⁷	-	-	10 ⁴	10 ⁵	10 ³	10 ³	10 ¹⁰	10 ¹⁰	10 ¹⁰	10 ⁸	10 ⁹	-	-	10 ¹¹	-	-	
	Dielectric Constant (1MHz)	-		4.9	4.9	6.0	6.5	177.7	-	-	-	-	-	-	8.9	9.6	9.6	8.6	8.5	13.2	-	8.1	-	-	
	Dielectric Loss Angle (1MHz)	(×10 ⁻⁴)		9	8.5	18	3	<1	-	-	-	-	-	-	17.0	19	18	3	2	-	-	4.0	-	-	
Loss Factor	(×10 ⁻⁴)	30	35	108	20	-	-	-	-	-	-	-	-	-	-	-	26	17	-	-	-	-			
Chemical Characteristics	Nitric Acid (60%) 90°C ,24H	(Weight Loss) mg/cm ²	-	-	-	0.01	-	0.07	6.0	-	-	0.04	≐ 0.00	-	1.11	0.18	-	-	-	0.01	-	0.00	0.30		
	Sulphuric Acid (95%) 95°C ,24H			-	-	0.00	0.00	0.79	0.26	-	-	-	0.01	≐ 0.00	-	0	0	-	-	-	0.01	-	0.00	0.20	
	Sodium Hydroxide (30%) 80°C ,24H			-	-	15.35	8.01	0.01	0.02	-	-	-	-	≐ 0.00	≐ 0.00	-	0.22	0.07	-	-	-	3.53	-	0.10	0.00

The values are typical material properties and may vary according to products configuration and manufacturing process. For more details, Please feel free to contact us.
* 1: All values for apparent density and bulk density are the same, except for the porous materials which lists apparent density only.


1kgf/mm²=9.807MPa 1cal/(cm · sec · °C)=418.6W/(m · K)



KYOCERA Corporation

Corporate Fine Ceramics Group

<https://global.kyocera.com/prdct/fc/>

Kyocera Fine Ceramics 

Product Inquiries→



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