



Technical characteristics

TECHNICAL CHARACTERISTICS OF SYNTHETIC RUBY CRYSTALS

Physical properties	crystalline structure	rhombohedral hexagonal single
	composition	Al_2O_3
	purity	99.99 %
	main impurities	Na, Si, Ca, Fe, Ga, Mg, Ti, Mn, Pb, Cu, Zn, Ni
	cleavage	conchoidal
	density	3.99 – 9.98
	dislocation density	$10^9 - 10^8 / \text{m}^2$
Thermal properties	melting point	2320 K
	softening point	softening point 2070 K
	specific heat	$7.5 \cdot 10^2 \text{ j/kg} \cdot \text{K}$ at 300 K
	thermal conductivity	40 W / m · K perpendicular at 300 K
	Thermal expansion	$6.2 \cdot 10^6 / \text{K}$ // C-axis
		$5.4 \cdot 10^6 / \text{K}$ // C-axis
Mechanical properties	hardness	Mohs 9
		Knoop 2200 face // C-axis
		Knoop 1800 face perpendicular C-axis
	Young's modulus	$4.4 \cdot 10^{11} \text{ Pa}$ at 300 K
	modulus of rupture	$4.0 \cdot 10^8 \text{ Pa}$ at 300 K
	compressive strength	$2.1 \cdot 10^9 \text{ Pa}$ at 300 K
	tensile strength	$1.9 \cdot 10^8 \text{ Pa}$ at 300 K
	Poisson's constant	0.30



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Chemical properties	acids and alkalis attack porosity	0 at 570 K 0
Electrical properties	dielectric constant electrical resistance	10.6 electric field // C-axis at 300 K 8.6 electric field perpendicular C-axis at 300 K $10^9 \Omega \cdot m$ at 770 K $10^4 \Omega \cdot m$ at 1270 K $10 \Omega \cdot m$ at 2270 K

Material characteristics	1. Porosity:	0
	2. Hardness:	Mohs 9 (only natural diamond is harder – Mohs 10)
	3. Composition:	Al_2O_3
	4. Purity:	99.99%
	5. Melting point:	2320 K



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