

Technical characteristics of synthetic Ruby Verneuil crystals

Physical properties	crystalline structure	rhomboedral hexagonal single
	composition	Al_2O_3
	purity	99,99 %
	main impurities	Na_2O , Si, Ca, Fe, Ga, Mg, Ti, Mn, Pb, Cu, Zn, Ni
	cleavage	conchoidal
Thermal properties	density	3.99 – 9.98
	dislocation density	$10^9 - 10^8 / \text{m}^2$
	melting point	2320 K
	softening point	2070 K
	specific heat	$7.5 \cdot 10^2 \text{ J/kg} \cdot \text{K}$ at 300 K
	thermal conductivity	$40 \text{ W} / \text{m} \cdot \text{K} \perp$ 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
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 strenght		$2.1 \cdot 10^9 \text{ Pa}$ at 300 K
tensile strength		$1.9 \cdot 10^8 \text{ Pa}$ at 300 K
Poisson's constant		0.30
Chemical properties		acids and alkalis attack
	porosity	0
Electrical properties	dielectric constant	10.6 electric field // C-axis at 300 K 8.6 electric field \perp C-axis at 300
	electrical resistivity	$10^9 \Omega \cdot \text{m}$ at 770 K
		$10^4 \Omega \cdot \text{m}$ at 1270 K $10 \Omega \cdot \text{m}$ at 2270 K