

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	
	density	3.99 – 9.98	
	dislocation density	$10^9 - 10^8 / \text{m}^2$	
	Thermal properties	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	Mohs 9	
		Knoop 2200 face // C-axis	
		Knoop 1800 face \perp 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 strenght	$2.1 \cdot 10^9 \text{ Pa}$ at 300 K	
	tensile strength	$1.9 \cdot 10^8 \text{ Pa}$ at 300 K	
Chemical properties	Poisson's constant	0.30	
	acids and alkalis attack	0 at 570 K	
	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	