Sapphire Crystal

Clear Synthetic Sapphire, a Single Crystal Aluminum Oxide, is an excellent material finding increasing uses in various fields. The hardest of all oxide crystals, it shows a unique combination of optical, mechanical, chemical and physical properties. Its optical transmission quality strength and hardness, heat resistance, dielectric properties, insulating characteristics, chemical inertness and insolubility make this Crystal a material of choice for aggressive environments and new high-tech scientific and commercial applications. In addition, because Sapphire has a hexagonal crystal structure, its optical characteristics change with the optic C-axis and it demonstrates birefringence, an additional appealing property for new high-tech uses.

Sapphire's Multitude Of Uses

Commercial quality

Sapphire manufactured in bulk quantities and at commercially acceptable purity levels, is a material of choice for the luxury watches industry where it is used to produce high strength and hardness watch windows. It also has several other industrial uses in the form of rods, cubes, cones, vee jewels, orifice nozzles etc.

Optical quality

Sapphire of good optical quality finds wide applications in UV to mid-IR Optics where it is the substrate of choice. Its optical uses are limited only from its birefringence and high cost of good polishing. Optical elements produced from standard optical quality Sapphire include Windows for High Temperature, Pressure, Corrosion, Abrasion and other demanding uses, Optical flats. Spacers, Thermo-couplers etc When manufactured with excellent crystalline structure at c-plane, a-plane and r-plane surface orientations and with crystalline ensuring the absence of fractures, slips, lineage and other defects, it can be used for the booming field of fine substrates in the following technologies: for the growth of III-V & II-vI compounds to produce Green LED and GaN blue Laser Diodes, for hybrid microelectronic applications, for IC microelectronic epitaxial deposition and especially for microwave IC's, for transducer applications and for the growth of super conducting materials.

Capabilities

LTP is an experienced producer of Sapphire. We grow both commercial and high optical qualities, currently using the cost efficient Horizontally Directed Crystallization Method (HDC). We operate out most of our 27 HDC stations designed and built by our company, to produce sizable Hard Doped and Undoped Crystals.

We market Sapphire in various forms: "as-grown" parallelepiped ingots, "as-cut" rough cleared slab "blanks" and semi finished and finished Sapphire components according to standard specifications. We also undertake orders to produce ingots and semi-finished and finished products up to the agreed specifications.

Typical ingot sizes that we grow are cut to clear slabs of 150 x 100 x 20 mm but sizes of up to 150 x 120 x 25 mm can be produced upon request.

Specifications

Material Properties	
Chemical formula	Al_2O_3
Standard cleared Ingot dimensions	L=120mm, W=100mm, T=20mm
Crystal structure data	Hexagonal Classed Rhombohedral negative uniaxial crystal
Lattice Constant	a=4,785 Ang, c= 12,991 Ang
Density (Specific gravity)	3,98 g/cm^3
Molecular weight	101.94
Hardness	Mohs scale 9
Melting Point	2040 °C
Water absorption	nil
Solubility	Insoluble in water and common acids + alkalis up to 1000 °C and not attacked by HF below 300 °C
Maximum operating temp.	2000 °C
Thermal Shock Resistance	790 W/m
Thermal Conductivity (at 100 C)	25.12 W/m/K
Specific Heat	0,418 Ws/g/K
Thermal Expansion Coefficient (TEC)	5,3 x 10^{-6} K at c-axis at 300K
Dn/dt	13 x 10^{-6} K^{-1}
Young's Modulus	4.4 x 105 Mpa at 300K
Poisson Ratio	0.30
Refractive index of Sapphire	1,760 at 0,63 µm wavelength

Special Configurations Available

- Watch quality cleared slabs and semi finished watch windows to your specifications.
- Optical quality slabs and elements to your specifications.
- Colored Sapphire options

Garnet (undoped YAG), also available. We grow upon request Optical quality of Undoped Garnet (YAG) ingots and we sell clear slabs and finished optical elements of YAG for IR and UV uses as a high quality substitute for Sapphire.

LT–Pyrkal

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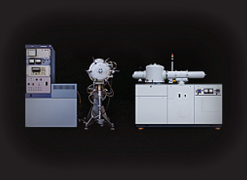

Crystal
Growing
Equipment