Optics

SINGLE CRYSTAL DIAMOND

OPTICAL GRADE

Optical grade single crystal diamond (SCD-O) is widely recognized as a premier optical material due to its exceptional combination of properties. Diamond's wide optical transparency from the ultraviolet through the infrared, combined with low microwave loss and high thermal conductivity, enables superior performance in demanding optical and RF applications. In single crystal form, diamond exhibits an atomically smooth surface finish, making it ideal for high-reflectivity optics and direct bonding to other materials.

FEATURES

- Single crystal CVD diamond
- Atomically smooth, polishable surfaces
- High thermal conductivity and chemical inertness
- Wide optical transmission window (UV–IR)
- Low microwave loss

APPLICATIONS

- Optical windows
- Laser optics
- High-power laser systems
- Optical mirrors
- RF and microwave components

COHERENT

Using plasma-enhanced chemical vapor deposition (CVD), together with world-class optics fabrication and coating capabilities, Coherent is a leader in producing both polycrystalline and single crystal diamond. Coherent's optical grade single crystal diamond (SCD-O) is an excellent solution for applications requiring small-format optics with ultra-high optical transmission and ultra-low scatter. The intrinsic crystal quality and atomic-scale surface finishes achievable with single crystal diamond enable exceptional optical performance in precision and high-power laser systems as well as other high performance optical applications.

In applications where microwave transmission is important, SCD-O is a high purity material that allows for very low microwave loss tangents for highly sensitive microwave applications.

Single Crystal Diamond – Optical Grade (SCD-O)	
Growth Method	Plasma Enhanced Chemical Vapor Deposition
Physical Characteristics	
Structure	Single Crystal
Crystalline Orientation	{1 0 0}
Thickness	0.25-5 mm
Surface Roughness - Sa	<0.5 nm
Material Properties	
Thermal Conductivity	≥2,200 W/mK (Thermal Grade)
Thermal Expansion Coefficient	1 (10^{-6} K^{-1})
Specific Heat (25 °C)	0.536 J/g-K
Optical Properties	
10.6 µm ABS coefficient	<0.05 (cm^{-1})
3-5 µm ABS coefficient	min 0.8 at 3.7 µm (cm^{-1})
1.064 µm ABS coefficient	0.005 (cm^{-1})
Birefringence	<5 x 10^{-5} Δn

Coherent offers multiple grades of CVD diamond tailored to specific optical, thermal, electronic, quantum, and custom requirements. Contact us to discuss material selection for your application.

sales@coherent.com
www.coherent.com