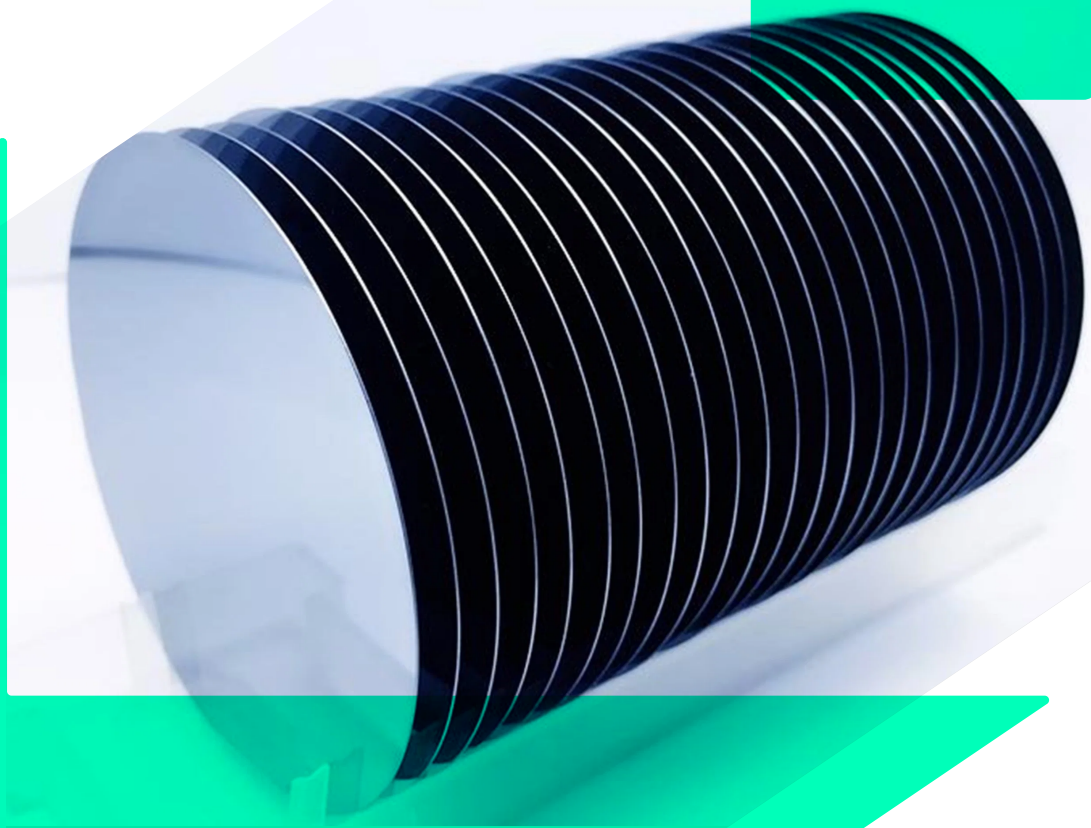
Sunshine Duqm
From Sultanate of Oman



CVD Diamond for
Thermal Management Applications

Sunshine Duqm LLC. specializes in developing CVD diamonds for thermal management, focusing on heat sinks and spreaders. With advanced facilities and expert teams, we lead innovation in this field.

Our Expertise

State-of-the-Art Facilities :

Utilizing advanced CVD technology, we produce high-quality polycrystalline and single-crystal diamonds with exceptional thermal conductivity and durability, supporting both large-scale and custom production.

Expert Team :

Sunshine Duqm LLC.'s team of scientists, engineers, and material specialists ensures our diamonds meet the demands of high-performance industries like electronics, automotive, and aerospace.

Tailored Thermal Management Solutions :

Our CVD diamonds, with thermal conductivity up to 2200 W/m·K, enhance heat dissipation in high-power electronics, lasers, RF devices, and semiconductors, improving system performance and reliability.

Applications

Heat Sinks :

Efficiently cool critical components.

Heat Spreaders :

Distribute heat evenly, reducing hot spots.

Our Products

Single Crystal CVD Diamond Plate

Product Description

Single-crystal CVD diamond plates offer superior thermal conductivity (up to 2200 W/m·K), making them ideal for heat dissipation in high-power electronics, lasers, RF devices, and semiconductors.

Size : 2mm to 20mm

Specifications and Tolerances

- Edges : Laser Cut
- Face / Surface Orientation : 100
- Laser Kerf : 3°
- Lateral Tolerance : +0.2/-0 mm
- Side 1, Roughness, Ra : polished, Ra <2 - 30 nm
- Side 2, Roughness, Ra : polished, Ra <2 - 30 nm
- Thickness Tolerance : +/- 0.05 mm
- Thickness Dimension : 0.3-0.5mm

Material Properties

- Nitrogen Concentration : < 5 ppb (Optional) N2 Controlled based on Requirements

Advantage

- Exceptional thermal conductivity : Higher than polycrystalline, offering superior heat dissipation.
- Isotropic properties : Uniform thermal performance in all directions, ideal for precision applications.
- High thermal stability : Performs well at extreme temperatures without degradation.
- Electrical insulation : Non-conductive, useful in electronic devices requiring thermal control without affecting electrical circuits.
- Minimal defects : Ensures higher reliability and efficiency in sensitive thermal management systems.
- Durability: Resistant to wear and chemical exposure, prolonging lifespan in demanding environments.

PolyCrystal CVD Diamond Wafer

Product Description

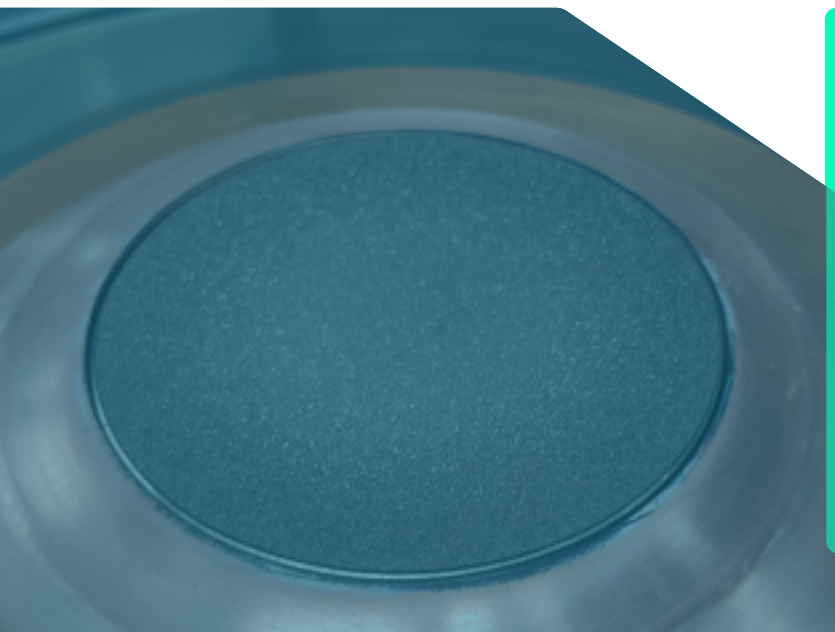
Polycrystalline CVD diamond (PCD) plates provide excellent thermal management with high thermal conductivity, though slightly lower than single-crystal diamonds. They are ideal for use in heat sinks and spreaders in electronics, RF devices, and power systems, offering efficient heat dissipation and enhanced durability, which helps improve the longevity and reliability of electronic components in demanding environments.

Specifications and Tolerances

- Diameter : Up to 4 Inch
- Thickness : 300um & 500um
- Thermal conductivity : Up To 1800 W/mK
- Surface : As grown & polished one /two side with 20nm
- Thickness Tolerance : +/- 5%
- Transmittance : up to 65%

Advantage

- High thermal conductivity : Superior heat dissipation, ideal for high-power electronics.
- Low thermal expansion : Reduces stress between materials during temperature changes.
- Chemical stability : Resistant to oxidation and chemical reactions at high temperatures.
- Wear resistance : Ensures durability and long-lasting performance in harsh environments.
- Radiation resistance : Suitable for space and high-radiation environments
- Electrical insulation: Useful in applications requiring thermal management without electrical conductivity.

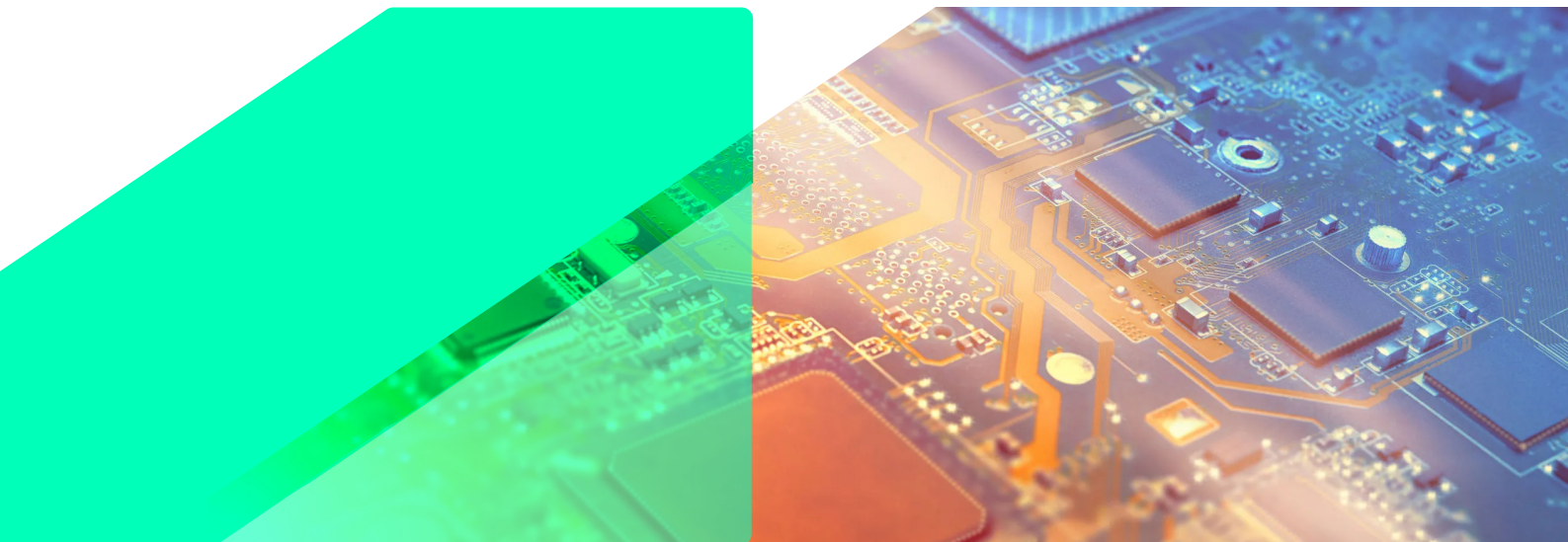


Why CVD Diamonds Outperform Traditional Materials

In high-performance applications, especially in advanced electronics, laser systems, and quantum technologies, CVD diamonds clearly outperform traditional materials, offering the best balance of thermal conductivity, electrical insulation, and mechanical strength.

Key performance criteria compared to other popular materials:

Property	Diamond	Copper	Aluminum	Aluminum Nitride (AIN)	Thermal Grease
Thermal Conductivity	1000-2200 W/m·K	400 W/m·K	205 W/m·K	140-180 W/m·K	1-5 W/m·K
Electrical Insulation	Yes (Very high resistivity	No (Good conductor)	No	Yes (Good insulator)	Yes
Mechanical Strength	Extremely high hardness	Moderate	Low	High	N/A (soft material)
Weight/ Density	3.52 g/cm^3 (light weight)	8.96 g/cm^3 (light weight)	2.7g/cm^3 (light weight)	~3.26 g/cm^3	N/A(used in small amounts)
Operating Temperature Range	Up to 1000^{0}C	Up to 400^{0}C	Up to 300^{0}C	Up to 300^{0}C	100 - 150^{0}C
Thermal Expansion	Very low (1-2 x 10^6/°C)	High (16.5 x 10^6/°C)	Moderate (23 x 10^6/°C)	Low (4 x 10^6 /°C)	N/A
Applications	High-power electronics, RF devices, laser diodes, quantum computing	Heat sinks, heat exchangers	Heat sinks, lightweight housings	Power electronics, semiconductor cooling	CPU/GPU thermal interface



Why Collaborate with Sunshine Duqm LLC. ?

Customization & Flexibility

We provide tailored CVD diamond solutions, adapting to specific technical requirements like shape, size, and thermal properties.

Quality & Reliability

Our products meet the highest industry standards, with stringent quality control ensuring consistent performance in demanding applications.

Collaborative Approach

We prioritize long-term partnerships, working with researchers, manufacturers, and industries to explore new uses for CVD diamonds.

Advanced Technology

We utilize the latest CVD technologies to deliver cutting-edge diamond materials with superior thermal and mechanical properties.

Scalability

Our facilities are equipped to handle both large-scale production and small-batch custom orders, ensuring we can meet the demands of any project size.

Expert Support

Our experienced team of scientists and engineers offers technical guidance and support throughout the development and integration process.

Exclusive Sales Agent in Japan

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