MOMENTIVE
performance materials

Titanium Diboride Powder, TiB2

Titanium Diboride (TiB2) is produced by Momentive Performance Materials using a continuous chemical process that controls stoichiometry and particle size to create high purity powder. The shapes of the processed crystals are flat, hexagonal platelets.

When solidified into shapes, the resultant ceramic is electrically conductive, a property very rare among ceramic materials. This makes it valuable in electrical applications and also enables it to be formed into complex shapes using electrical discharge machining (EDM). TiB_2 combines superior hardness and corrosion resistance with a high melting point (>2900°C) and good oxidation resistance to 1000°C.

Applications

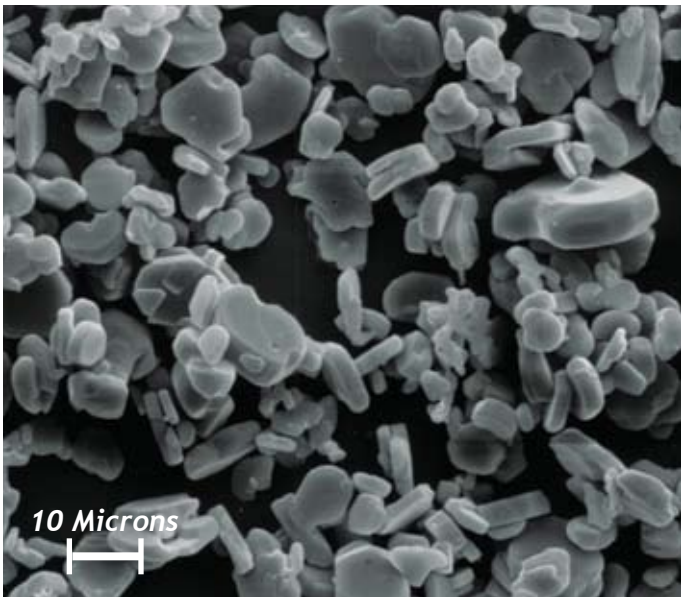
- Electrically conductive composites such as aluminum evaporation boats
- Complex, sinterable TiB_2 shapes
- Additives for producing specialty ceramic composite materials
- Refractory material and antioxidant additive that is nonreactive to most molten nonferrous metals and alloys
- Thermal management materials

Key Properties

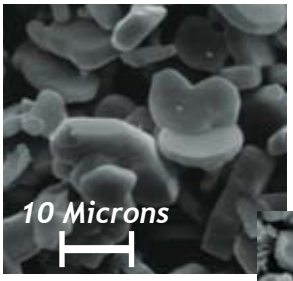
Extreme Hardness. Nearly as hard as diamond when sintered, TiB_2 is tough enough to be used as military armor and improves the fracture toughness of ceramic cutting tools and other components.

Electrical/Thermal Conductivity. As an excellent conductor of both electricity and heat, TiB_2 is valuable in electronic and specialty applications. TiB_2 enhances thermal conductivity when used as a filler in polymeric matrices.

Chemical Resistance. Titanium Diboride will not react with molten, nonferrous metals including Cu, Zn and Al. TiB_2 is used as crucibles, vacuum metallization components and electrodes for processing these materials.



Grade HCT-30-1000x.



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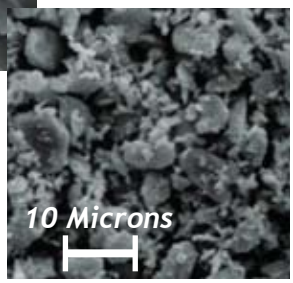

Grade HCT-F-1000x.

Titanium Diboride Powder, TiB_2

Simplified Fabrication

Titanium Diboride may typically be hot-pressed or HIP'd into desired shapes. TiB_2 is also machinable by EDM techniques due to its electrical conductivity.

Titanium Diboride Shapes—Typical Properties*

Physical Properties	Value
Density (theoretical)	4.52 g/cc
Melting Point	2850 - 2900° C
Thermal Expansion	8.1 x 10^{-6}/ ° C
Thermal Conductivity @25° C @2300° C	 60-120 W/m-K 55-125 W/m-K
Electrical Resistivity	10-30 micro-ohm-cm
Flexural Strength	350-500 MPa
Modulus of Elasticity	550 GPa
Knoop Hardness	3000 kg/mm^2

* Properties will vary depending upon method of fabrication.

Chemical Resistance—Typical

Oxidation	Resistant Below 1000°C
Molten Metals (Non Iron) Non-Basic Slags, Cryolite	Resistant
Hydrogen Fluoride, Hydrochloric Acids	No Reaction
Hot Sulfuric Acid	Reacts
Nitric Acid, Hydrogen Peroxide	Soluble
Molten Alkaline, Carbonate and Bisulfate Compounds	Dissociates
Molten Fe, Ni, Co	Reacts
Molten Cu, Zn, Al	No/Low Reaction

A Variety of Powder Grades

HCT

A high purity powder, Grade HCT has virtually no second phase contaminants and only low, controlled levels of carbon, oxygen and nitrogen. Alkalis, alkaline earth and most metals are typically undetectable. It is available in two grades: HCT-30 and HCT-40.

HCT-30D

Grade HCT-30D is tailored for fabrication by the hot-pressing process. Its composition provides for ease of processing and optimizes the mechanical properties of the component shapes.

HCT-F

Grade HCT-F powders are designed for use in applications requiring reduced particle size without sacrificing high purity.

Chemical Analysis—Typical

Chemical Analysis	HCT-30	HCT-40	HCT-30D	HCT-F
Titanium (%)	67-69	67-69	67-69	67-69
Boron (%)	29-32	29-32	29-32	29-32
Carbon (%), max.	0.50	0.75	0.50	0.50
Oxygen (%), max.	0.50	0.75	0.50	3.0
Nitrogen (%), max.	0.20	0.20	0.20	0.20
Trace Metal Analysis* (%) (typical)	Fe-0.02 Zr-0.015	Fe-0.029 Zr-0.015	Fe-0.15 Co-0.15 Ni-0.15	Fe-0.03 Zr-0.015

* Ca, Co, Cr, Cu, Mg, Nn, Mo, Na, Ni, V, W, Zn are undetectable at or below 30 ppm by ICP Emission Spectroscopy

Physical Properties—Typical

	HCT-30	HCT-40	HCT-30D	HCT-F
Surface Area (m^2/g)	0.25	0.25	0.25	1.0
Mean Particle Size (µ)	14	14	14	3-6
Screen Analysis	99% -325 Mesh	99% -325 Mesh	99% -325 Mesh	100% -325 Mesh

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