MATERION

Data Sheet

Aerospace Materials

Inorganic Chemicals for Thermal Protection Systems & Specialty Coatings for Aerospace Applications

In the world of Aerospace, there is an omnipresent demand for innovation in the field of protective coatings. Advancements in airframes, requirements to reach higher speeds, greater altitudes and to persevere over multiple re-entries necessitate materials and chemicals that support the exact demands of new technologies and applications. Platforms for terrestrial and deep space exploration also require sourcing high-reliability materials that perform in extreme environments, such as tremendously high temperatures. Finding a reliable, ITAR compliant supplier capable of partnering on commercial development in the ever-growing and expanding aerospace market can prove to be a challenge for many.

With a presence originating from early innovation for the Space Shuttle Program, Materion continues to produce complex Boride, Carbide, Silicide, and Nitride compounds for a host of terrestrial, subterranean, and exoearth technologies. With more than 50 years of experience, a strong supply chain, and the ability to customize complex materials and characteristics, Materion is an accessible partner for those venturing into the new era of space exploration and flight.

Protecting Metal

Structural metal interacts and reacts with the environment around it. Temperature, pressure and contents of an environment strongly influence the rate and form of a reaction. Such reactions can eventually threaten the airframe, platform and contents of a vessel. Materion produces a range of Boride, Nitride, Silicide and Carbide powders that are key in specially applied protective coatings for the most complex challenges, including high shock, velocity and temperature. Where direct formation of the protective coatings is not possible, these compounds can be specially applied to reduce friction and shock and to form an engineered protective skin custom to the needs of the airframe or vessel.

Protecting Ceramics and Composites

In the late 1950s, extensive work was being initiated in the notable mission of landing humans on the moon. The critical first step towards vehicle survivability, beyond the role of shock and shape during re-entry, was improving the craft's ability to dissipate and ride out the intense heat generated by friction and interaction of the craft with the outer atmosphere. Where bare metal would certainly melt, the early PTFE containing heat shields lead the way to lighter weight nylon phenolic and other ablator technologies to protect human astronauts. Custom blends of Borides, Carbides and Silicides could also be specially deposited onto lower temperature surrounding parts of the missiles and re-entry vehicles or applied to new ceramic tiles or textiles to facilitate multiple atmosphere re-entries at extreme velocities. Visionaries at Materion, formerly known as CERAC, developed a set of silicides to work with other compounds, crucial to the success of the Space Shuttle Program. When appropriately incorporated within the overall system design, these silicides enable superior radiative properties, enhance thermal stability and remain central to Materion's Thermal Protection System material offerings.

Leading Edge, Nose and Portholes

As horizontal landing has matured, the challenge continues at the hottest, most complex locations, where some are essential for navigation and exo-vehicle operation. Thermal failure during re-entry or hypersonic flight at these critical points can endanger the entire vehicle. These specific locations include the landing gear, the leading edges of the wings or flaps and the windows or apertures of the vessel. For many years, NASA sponsored work with Carbide, Nitride, Silicide and Boride mixtures to create new, innovative applications for re-entry into the atmosphere and safe landing.

Benefits

- Decades of full-scale production of key powders.
- Vertically integrated chemical synthesis and characterization.
- Ability to leverage capabilities and partner on combinational approaches for aerospace and defense.

Technical Capabilities

- Specialists in handling hazardous and difficult materials.
- Material customization and manufacturing.
- Custom particle sizing for optimal material performance.
- Controlled atmosphere handling.
- Specialty and custom packaging.

Quality Certifications

- ISO 9001:2015
- ISO 17025 Lab Accreditation
- ISO 14001 Environmental

Available Materials

Materion has continued to leverage its ability to create reproducible powder compounds, blends and mixtures at scale and economy for research and production in thermal protection systems, and specialty coatings for aerospace applications.

Compound	Mesh Size	Purity
Silicides		
B6Si	-200 mesh	98%
TaSi2	-100 mesh	99.99%
MoSi2	-325 mesh	99.5%
CrSi2	-325 mesh	99.5%
Mg2Si	-20 mesh	99.5%
Carbides		
HfC	-325 mesh	99.5%
Mo2C	-325 mesh	99.5%
NbC	-325 mesh	99.5%
SiC	7 mic or less	99.5%
B4C	-280 mesh	99.5%
WC	<1 micron average	99.5%
TiC	<2 micron average	99.5%
TaC	-325 mesh	99.5%
Borides		
CrB2	-325 mesh	99.5%
HfB2	-325 mesh	99.5%
TiB2	-325 mesh	99.5%
W2B	-325 mesh	99.5%
ZrB2	-325 mesh	99.5%
Nitrides		
HfN	-325 mesh	99.5%
Ca3N2	-200 mesh	99%
TaN	-325 mesh	99.5%
TiN	-325 mesh	99.5%
ZrN	-325 mesh	98%

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