

Nevada Thermal Spray Technologies (NTST)

NTST website: www.nevadathermalspray.com

Contact: Dominic, 702-449-2154, dominic@nevadathermalspray.com

Silicon Carbide (SiC) Coatings

General Information:

NTST has developed the unique capability to fabricate pure SiC (i.e. 100% SiC), SiC cermet ($x\text{SiC} + y\text{Si}$, e.g. 90SiC/10Si), and SiC/Si graded coatings on any substrate material. SiC is extremely difficult to fabricate as a coating due to its tendency to sublime at high temperature.

Silicon Carbide Facts:

The benefits of SiC include low density, high strength, low coefficient of thermal expansion, high thermal conductivity, good electrical properties, high decomposition temperature (4530 F), and excellent resistance to corrosion (i.e. alkaline and acidic). SiC is the third hardest material after diamond and boron carbide making it extremely valuable for wear and dual wear-corrosion applications.

Silicon Carbide Applications:

Carbon composite materials (CCM) are finding more and more applications in industry due to the strength, stiffness, and weight of these materials. They must, however, be protected when in service. SiC is an excellent choice for these coating applications due to the unique properties of SiC.

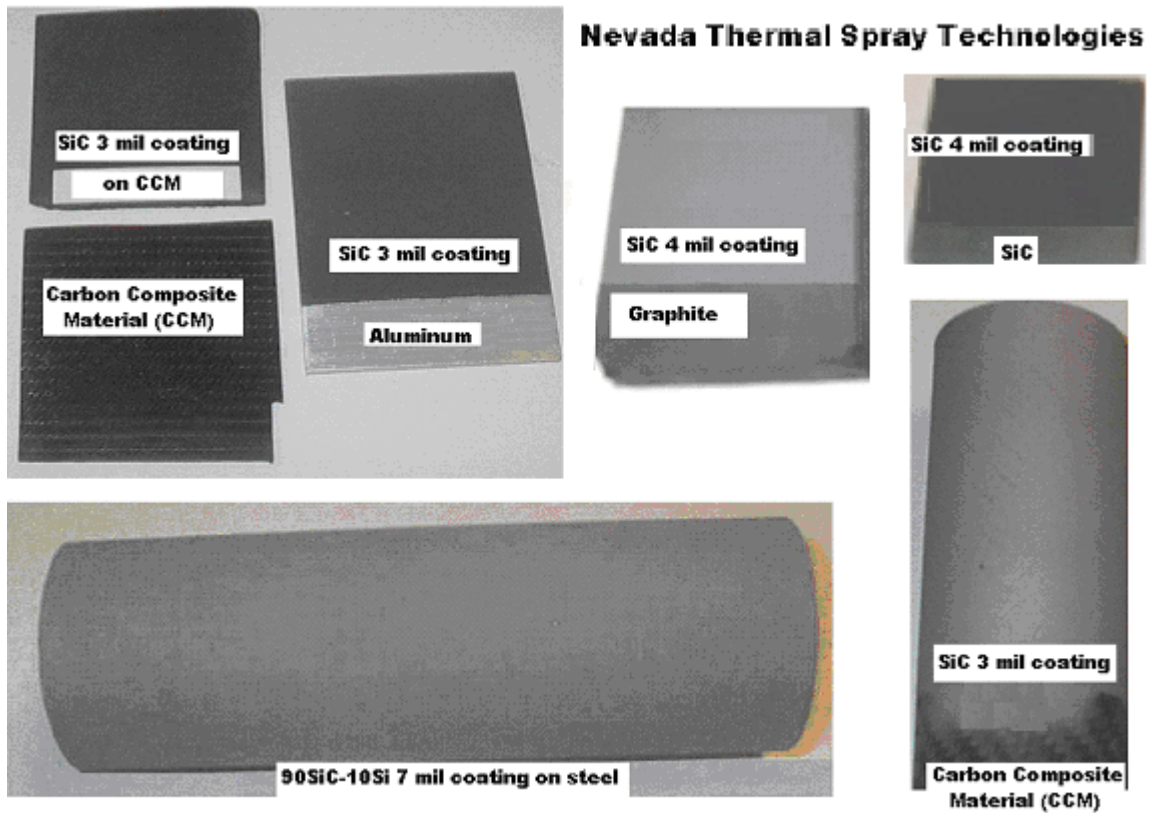
SiC materials are currently used in over 30 industries. Applications for heat exchangers, refractory materials, and wear applications abound. Wear applications include pump seal faces, shaft sleeves, and valves.

Due to the high thermal conductivity of SiC, it is an excellent choice for applications requiring substantial thermal shock resistance and refractory heat transfer surfaces. SiC materials will perform well at high temperatures. It is widely used in semiconductor electronics.

SiC Coating Characterization

NTST SiC coatings are dense, hard, and wear resistant. Porosity is less than 2%, hardness is 9.2 (i.e. Mohs), bond strength exceeds 5000 psia, and surface roughness is 145 microinches Ra.

NTST SiC coatings can be deposited on steel, aluminum, graphite, silicon carbide, and carbon composites as illustrated in Figure 1. Figure 2 illustrates a typical photomicrograph (400x). Figure 3 illustrates the as-sprayed surface morphology of a typical SiC coating (160x).



SiC Coatings on CCM, aluminum, graphite, SiC, and steel

Figure 1. NTST SiC Coatings on Various Substrates

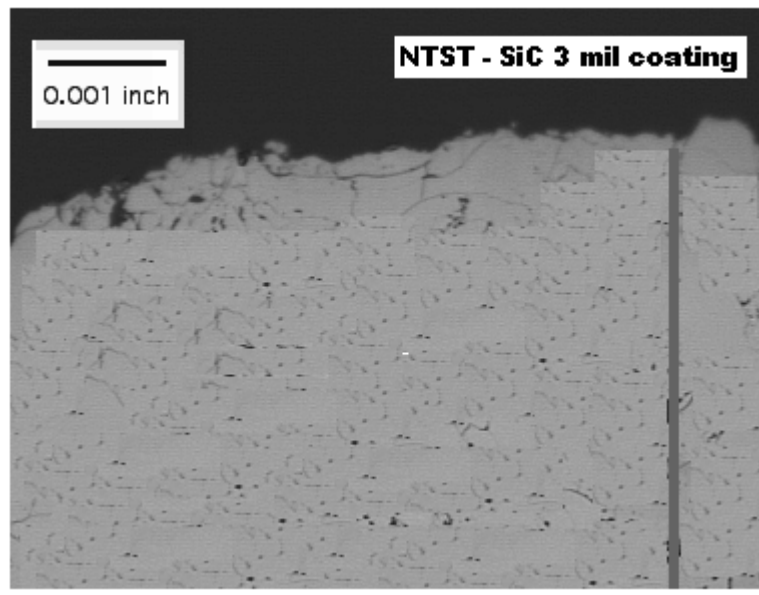


Figure 2. SiC Photomicrograph

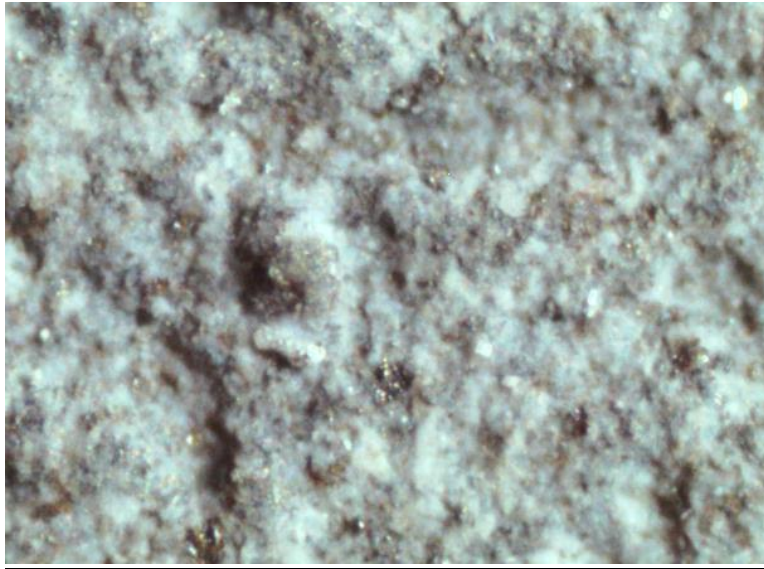


Figure 3. SiC Coating Surface Morphology (160x).