

International Advanced Research Centre for Powder Metallurgy & New Materials (ARCI)

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Dense silicon carbide (SiC) coatings by chemical vapour deposition (CVD) technique

Overview

Theoretically dense SiC coating processed by chemical vapour deposition (CVD) exhibits superior physical, mechanical, thermal and optical properties with excellent wear, abrasion and chemical corrosion resistance. The properties of CVD SiC coating can be tailored by control of various parameters including reactor design, process temperature, pressure, reactants composition and flow geometry. ARCI has established a CVD system for coating of large size components (up to 1.0 m meter) by thermal deposition of methyl-trichlorosilane (MTS) in excess of hydrogen. High density CVD SiC coating on various substrates with different geometries have been produced. It has been demonstrated that the CVD SiC coating can be polished up to the RMS surface roughness < 1 nm. ARCI also has the capability to produce self-standing CVD SiC parts.

Key Features

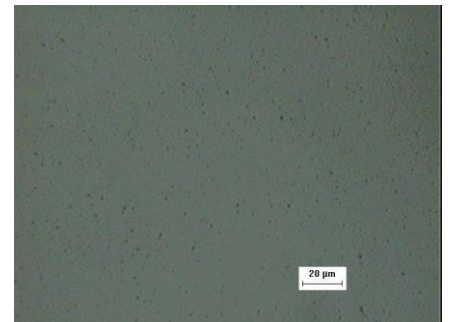
- State-of-the art CVD SiC coating facility.
- The processes technology has been established
- SiC coating on different size and shapes can be produced.
- CVD SiC coating can be polished to very high surface finish (<1 nm).



Chemical vapour deposition (CVD) facility

Potential Applications

- Reflectors for high energy laser and synchrotron radiation.
- Wear and corrosion resistant coatings
- Reflectors for concentrated solar power (CSP) applications
- Solar collectors and concentrators for astronomical telescopes.



SEM micrograph for polished CVD SiC coating

Technology Readiness Level

- The process technology and repeatability have been established.

IPDI*	1	2	3	4	5	6	7	8	9	10
Activities	Basic concepts and understanding of underlying scientific principles	Short listing possible applications	Research to prove technical feasibility for targeted application	Coupon level testing in stimulated conditions	Check repeatability/consistency at coupon level	Prototype testing in real-life conditions	Check repeatability/consistency at prototype level	Reassessing feasibility (IP, competition technology, commercial)	Initiate technology transfer	Support in stabilizing production
Status										

Major Publications

Centre for Solar Energy Materials (CSEM)

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