

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

Balapur P.O., Hyderabad – 500005, Telangana, India



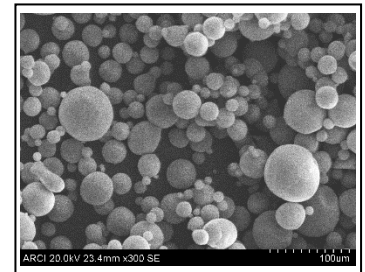
Ready-to-press and sinterable silicon carbide (RTP SiC) granules

Overview

Ready-to-press silicon carbide (RTP SiC) granules is being produced using spray drying or spray freeze drying technique through an intermediate colloidal processing route. This method is capable of producing different size spherical granules with narrow size distribution and improved flow characteristics. As the granules are produced from uniformly dispersed slurries of SiC powder, hence wide range of additives can be accommodated in the formulation of the RTP granules. This process is beneficial to manufacture the feedstock for producing green SiC compacts with high density, defect free homogenous microstructure. The sintered products thus produced exhibit superior properties than conventionally produced SiC. The technique has been adapted to produce RTP granules comprising water sensitive nitride based composite powders.

Key Features

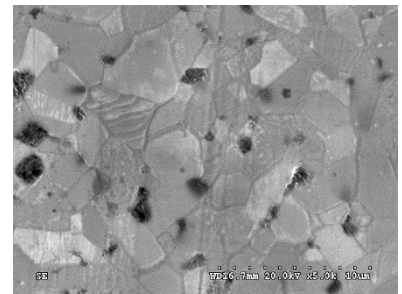
- Cost effective technique to produce RTP SiC granules.
- Flexibility to incorporate either solid-state or liquid-phase sintering additives in the formulation of RTP granules.
- Control on granule size with narrow distribution
- The process can be adopted for manufacturing various oxide or non-oxide ceramics.
- Up to 97.8 % relative density achieved in the sintered parts.



SEM micrograph of spray-freeze-dried RTP SiC granules

Potential Applications

- Feedstock for manufacturing of high performance SiC, Si₃N₄, SiAlON components



SiC inserts produced by use of ARCI produced RTP SiC granules

Technology Readiness Level

- RTP granules processed in the laboratory scale
- Scaling up the process is in progress

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 simulated 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

1. P. Barick, B. P. Saha, S. V. Joshi and R. Mitra, Spray-freeze-dried nano-crystalline SiC containing granules: processing, compaction behaviour and sintering, *J. Euro. Ceram. Soc.*, 36 (2016), 3863-3877

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