

Examples of Fine Particle Composite Production

Application of Carbon Nano Tube on Resins

Carbon nano tube (2 μm) → Bonded into composite → Enlarged image (2 μm) → Composite with enhanced affinity to resin and improved dispersibility → Use: High strength resin filler

Nano-resin (1 μm) → Bonded into composite → Enlarged image (200 μm) → Composite with enhanced affinity to resin and improved dispersibility → Use: High strength resin filler

Resin (50 μm) → Bonded into composite → Enlarged image (20 μm) → Composite with enhanced affinity to resin and improved dispersibility → Use: Master batch for high strength resin

Carbon nano tube (2 μm) → Bonded into composite → Enlarged image (20 μm) → Composite with enhanced affinity to resin and improved dispersibility → Use: Master batch for high strength resin

Application for Electrode of SOFC (solid-oxide fuel cell)

NiO (5 μm) → Bonded into composite → Particle composite with well-controlled structure fabrication and increased interface area on the nano-level → Use: Fuel side anode for low temperature actuated SOFC

YSZ (1 μm) → Bonded into composite → Particle composite with well-controlled structure fabrication and increased interface area on the nano-level → Use: Fuel side anode for low temperature actuated SOFC

La₂O₃ (5 μm) → Bonded into composite → Particle composite with high surface activity, produced without using sintering process → Use: Air side cathode for low temperature actuated SOFC

SrCO₃ (5 μm) → Bonded into composite → Particle composite with high surface activity, produced without using sintering process → Use: Air side cathode for low temperature actuated SOFC

MnO₂ (5 μm) → Bonded into composite → Particle composite with high surface activity, produced without using sintering process → Use: Air side cathode for low temperature actuated SOFC

LaSrMnO₃ (4 μm) → Bonded into composite → Particle composite with high surface activity, produced without using sintering process → Use: Air side cathode for low temperature actuated SOFC

ADVANCED TECHNOLOGY FOR FINE PARTICLES



HOSOKAWA MICRON *Process Technologies for Tomorrow*

HOSOKAWA MICRON CORPORATION

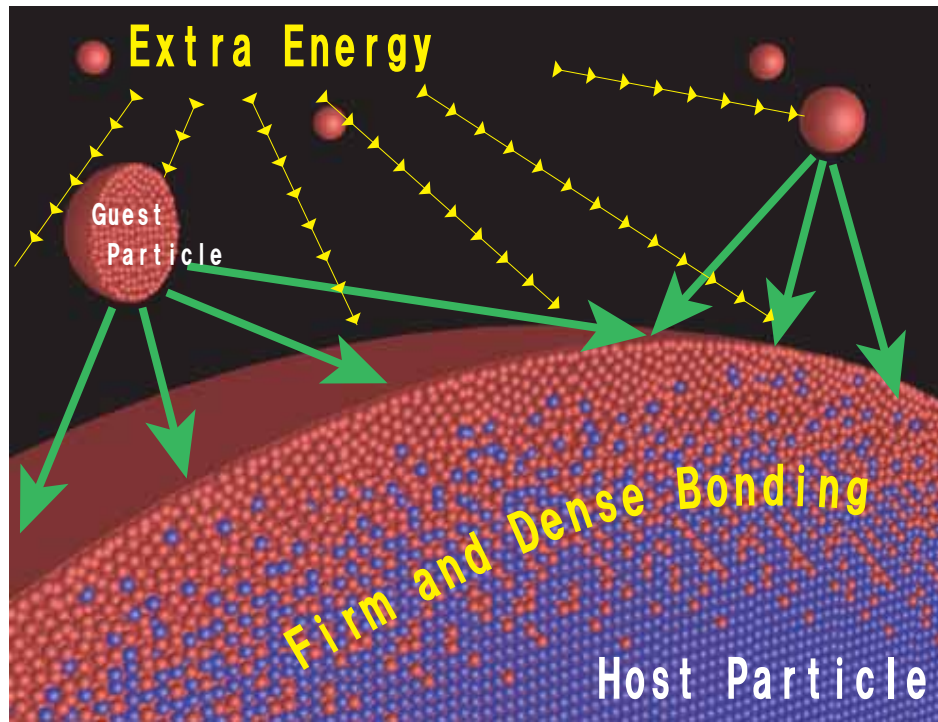
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HOSOKAWA MICRON **HOSOKAWA MICRON CORPORATION**

HOSOKAWA's Advanced Technology for Making Fine Particle Composite

Material Using Mechano Chemical Bonding (MCB) Technology



As shown in the image drawing, using MCB Technology, molecular level of bondings take place at the surface of particles thus creating a composite of fine particles forming a nano-scale bonding structure at the interface between host and guest particles.

Compared to wet processes, this process is simpler to operate and applicable to broader range of materials and particles.

Using the MCB Technology, highly functional composites can be designed and produced.

Due to the way energy is applied in this process, the control is not limited to the surface bonding but the formation of particle shape can be accomplished.

MECHANOFUSION SYSTEM

Particle composite production system

Mechanofusion®



By applying mechanically generated load to the material during processing, Mechanofusion not only precisely mixes different types of particles but also produces composite materials as well as controlling the formation of particle shape.

The Mechanofusion system has been successfully applied in numerous industrial fields. In addition to the standard models, specially designed medical GMP models are available having a capacity range of 0.1-liter to 1.0-liter.

Technical Specification
Models: AMS-Lab through to AMS-100F
Motor: 2.2 up to 150 kW
Capability: 1.2 up to 200 liters

NANOCULAR SYSTEM

Hosokawa has developed a new concept of process technology based on the MCB Technology in combination with other form of energy such as plasma or high magnetic field energy enabling to create functionally advanced composites with nano-bonding structure.

Nano-particle composite production system

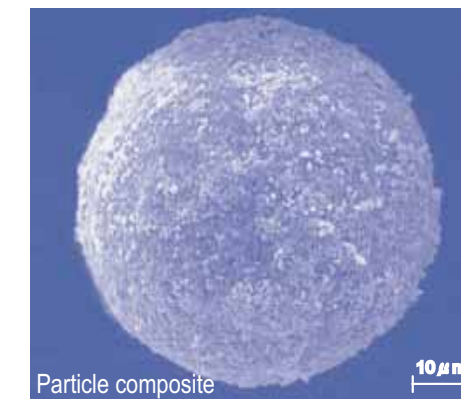
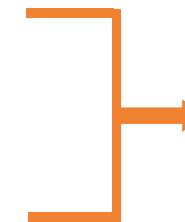
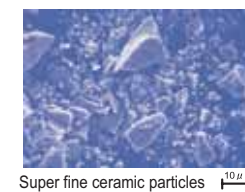
NANOCULAR™ P-Laboratory model



NANOCULAR P-Laboratory model is used in Laboratories for development work on advanced materials. In conjunction with mechanical energy the new system utilizes plasma irradiation to clean the particle surface, enabling to form a strong bonding thus creating NEW functional materials.

Technical Specification
Model: NC-Lab-P
Motor: 2.2 kW
Effective Capacity: 0.1 liter

An application for electronic and electric component (metal / ceramic)



The photograph shows a composite particle formed by bonding super fine ceramic particles on the surface of a fine metal particle. When the composite is compressed and sintered, the resultant is a new material that is electrically insulated but still magnetically functioning.

Nano-particle composite production system

NANOCULAR™ P-Continuous model



NANOCULAR P-Continuous system is used for continuous commercial production of advanced materials. In conjunction with mechanical energy the new system utilizes plasma irradiation to clean the particle surface, enabling the creation of NEW functionality materials in a continuous operating system.

Technical Specification
System Composition: NC-400-P, Vacuum pump, Chiller unit and Pre-mixer
Installed Capacity: Approx. 100 kW
Process Capability: 10 up to 100 kg/hr

Particle composite production system

Mechanofusion® for Pharmaceutical GMP Application



◀ **AMS-Lab-GMP**
For production of clinical trial samples to commercial productions.
Motor: 2.2 kW
Effective Capacity: 1 liter /Batch

AMS-Mini-GMP ▶
For development of small samples
Motor: 0.75 kW
Effective Capacity: 100 mL /Batch

