

# Particle Design

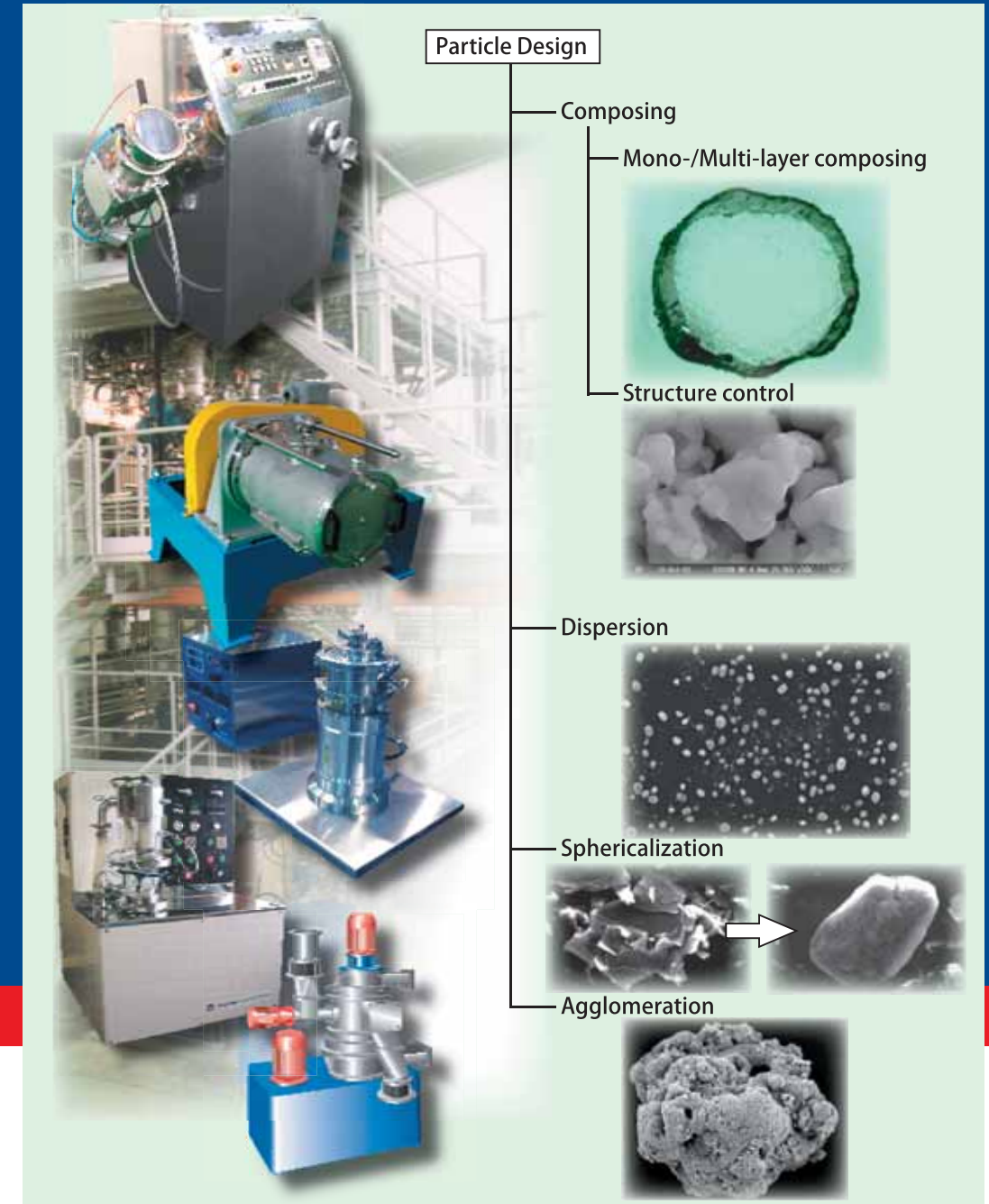
**Head Office**  
**Hosokawa Micron Corporation**  
9, 1-Chome, Shoudai-Tajika, Hirakatashi,  
Osaka 573-1132 Japan  
Tel : +81-72-855-2224 Fax : +81-72-855-2679  
e-mail : info@hmc.hosokawa.com

**Korea**  
**Hosokawa Micron (Korea) Ltd.**  
Hanshin Chamshil Core Officetel 420 11-9, Shinchon-  
Dong, Songpa-Gu Seoul, 138-733 Korea  
Tel : +82-2-420-5691 Fax : +82-2-420-5693  
e-mail : hmkorea@hosokawakorea.co.kr

**China**  
**Hosokawa Micron (Shanghai) Powder Machinery Co.,Ltd.**  
Room 1803 COFCO Tower, No.440 Zhong Shan Road  
(S.2), Shanghai, China  
Tel : +86-21-5306-8031 Fax : +86-21-6404-7579  
e-mail : shanghai@hosokawa.com.cn

**Malaysia**  
**Hosokawa Micron (Malaysia) Sdn Bhd**  
No.35, 1st Floor, Jalan USJ10/1G, Taipan Business  
Centre 47620 UEP-Subang Jaya, Malaysia  
Tel : +60-3-5634-0391/0452  
Fax : +60-3-5634-3946  
e-mail : admin@hmm-hosokawa.com.my

**India**  
**Hosokawa Micron India Pvt. Ltd.**  
2112, 13th Main Road, Anna Nager West, Chennai  
600 040, India  
Tel : +91-44-26211-257 Fax : +91-44-26211-295



Process Technologies for Tomorrow

**HOSOKAWA MICRON CORPORATION**



URL <http://www.hosokawamicron.co.jp>

Hosokawa Micron Corporation is a member of the Hosokawa Micron Group, responding to global needs through emphasis on materials science and engineering. The Group is an international provider of equipment and systems for powder processing, thermal processing, environmental protection, and plastics processing. The Group maintains facilities for research, engineering, manufacturing, and service in each of the world's major industrial markets.



Process Technologies for Tomorrow

**HOSOKAWA MICRON CORPORATION**



# Particle designing technology in Hosokawa Micron Group

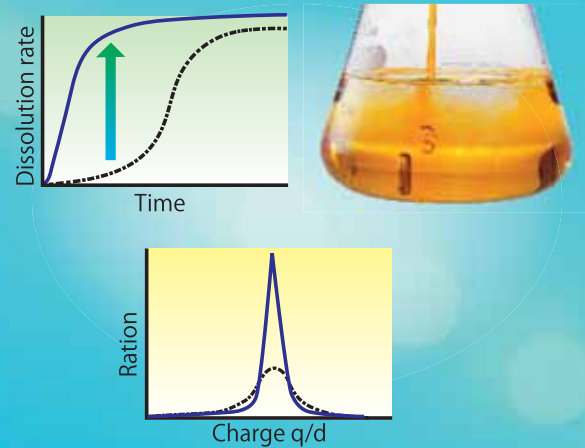
- Creation of high value particles by Nano particle technology -

## What is Particle Design ?

"To improve powder characteristics and/or to create new powder characteristics without changing any chemical properties" quoted from the Particle Design Engineering, edited by "The Society of Powder Technology, Japan (Sangyo-Tosho)".

## What can be done by the particle design?

- Enhancing flowability and packing density of powder
  - Improving thermal-, mechanical- and electrical characteristics
  - Improving solubility
  - Controlling dissolution rate
  - Combining multi functions on an individual particle
  - Improving chemical reaction speed
- These effects have been confirmed.



## Why do we need the particle design now?

Agglomeration and sticking problem of powders are well known. Especially Nano powders, which draw much attention recently, have very stronger tendency of those problems than conventional micron powders. In order to pull out own high performance of nano powder for solving the problems, chemical method has been also considered. However the mechanical particle designing technology, which does not use any additives is paid attention today because the product finally has high dispersion and purity.

## Particle design by Dry and Wet methods

### Wet method

Polymerization, Precipitation onto particle surface, Sol-Gel, Wet synthesis

#### Features

- High sphericity particles
- Composite particles with very homogeneous coating layer

#### Disadvantages

- Chemical reaction is generally used therefore there are limitation in raw material
- Reduction of environment load is difficult since the wet method usually uses organic solvents.
- Usually drying is required after the process therefore there are problems of re-agglomeration and high costs.

### Dry method

Using equipment which are developed from grinding machines or mixers.

#### Features

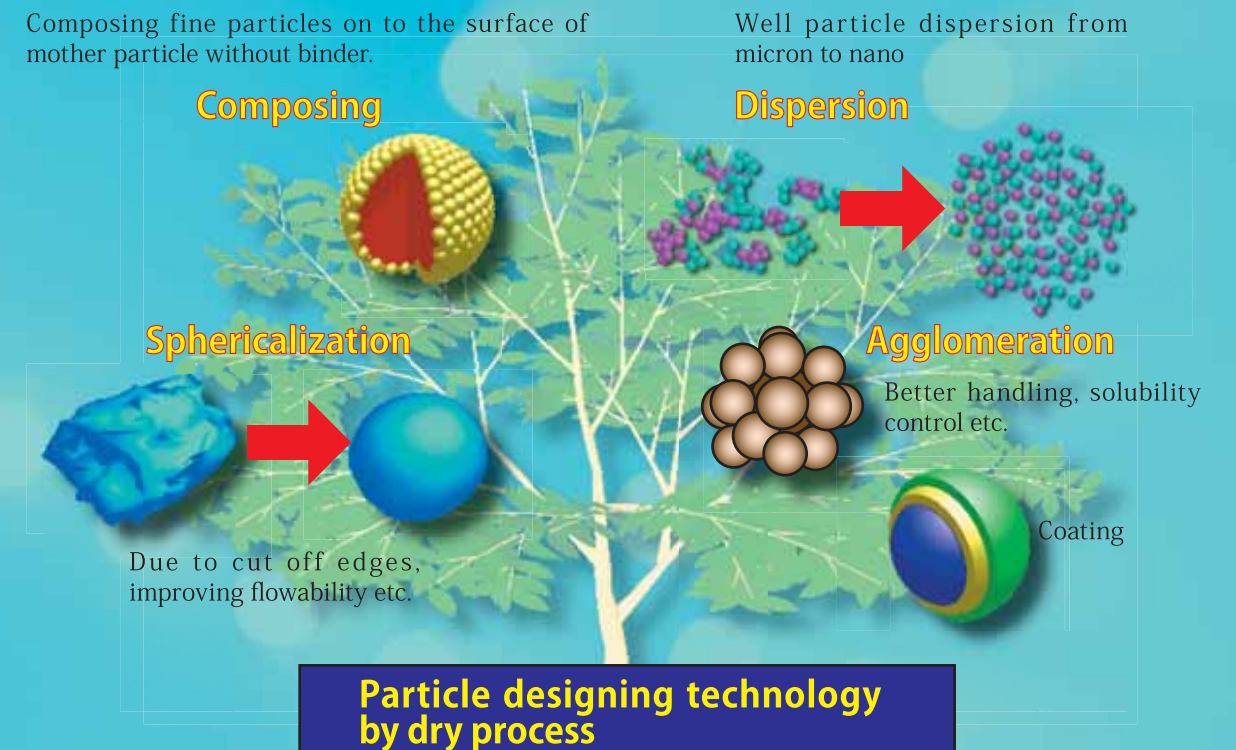
- Infinite combination of raw materials (Org.-Org., Org.-Ino., Ino.-Ino.)
- Drying process is not necessary.
- Simple process
- Low energy cost

#### Disadvantage

Coating layer not so completely homogeneous as wet method

## Individual functions and purposes of particle designing technology

- 1.Composing :** The method is to combine different particles into one particle. It is possible to enhance chemical reaction, flowability and heat resistance, controlling electric performance and solubility, and these combinations.
- 2.Dispersion :** Especially using nano powders, it is possible to improve color tone, reactivity, calcinations ability and mechanical intensity and so on.
- 3.Sphericalization :** By sphericarization it is possible to improve flowability and packing density.
- 4.Aggglomeration :** It is possible to achieve easy handling with controlled agglomeration size and then control of solubility etc. with coating of other kind of particles.



**Hosokawa's hard- and software  
Nanocular, MechanoFusion, Nobilta,  
Faculty, Agglomaster**

### Applications

- 【Electric, Electronic】
- 【Pharmaceutical】
- 【Chemical】
- 【Pigments】
- 【Environment】
- 【Information technology】
- 【Biotechnology】
- 【Cosmetics】
- 【Architecture】
- Others







Mechano Chemical Bonding, Nano particle composite production system

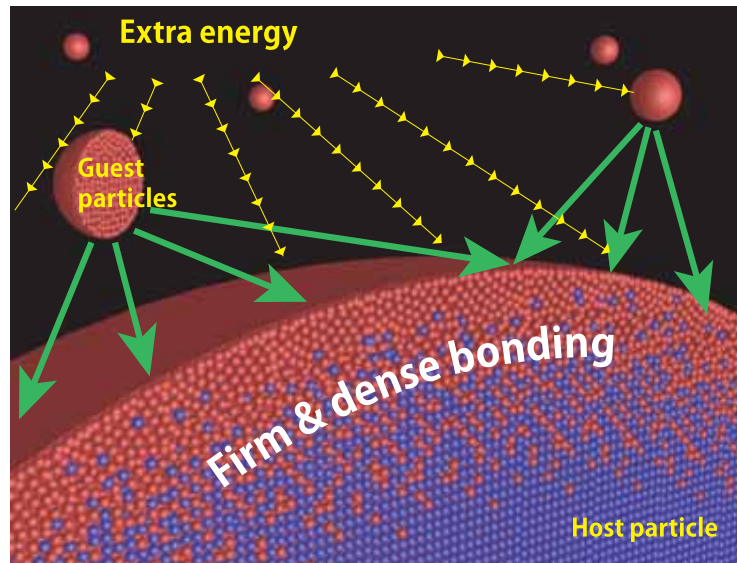
## NANOCULAR®

The state-of-the-art system for production of nano particle composites by Mechano Chemical Bonding technology using nano powder raw materials.

Creating new value-added material by functionalization of particles and composing of nano powders under optimized condition.

### The state-of-the-art nano particle composing technology, What's Mechano Chemical Bonding(MCB)?

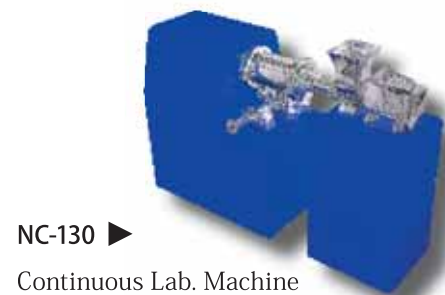
In conjunction with mechanical energy, press and shear forces, the machine utilizes extra energy such as plasma or high magnetic field energy enabling the creation of new functional materials.



Schematic figure of MCB technology

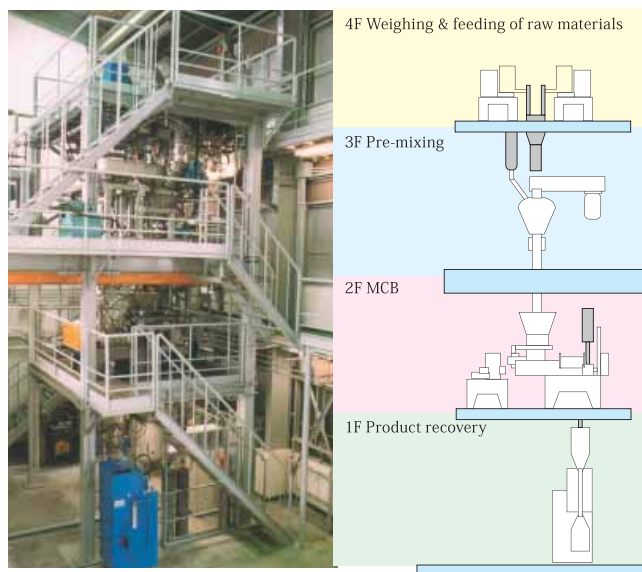
#### Features

- Firm and dense mechano chemical bond of nano powders
- Dry process on batch or continuous operation
- To achieve particle structure control such as nano-, multi layer composite etc.
- To achieve operation under low temperature plasma, vacuum and inert gas condition



NC-400 ▶  
Continuous production system

utilities  
-Pre-mixer  
-Vacuum pump  
-Chiller unit



#### Specification

型式	NC-LAB	NC-130	NC-400
Motor [kW]	2.2	7.5	30
Rotor [rpm]	4,000	6,000	2,200
Capacity [kg/h]	0.1L/Batch	1 ~ 10	10 ~ 100
Width : W[mm]	900	600	1,240
Length : L[mm]	1,350	1,010	1,540
Height : H[mm]	1,450	550	1,150
Weight [kg]	450	230	1,100

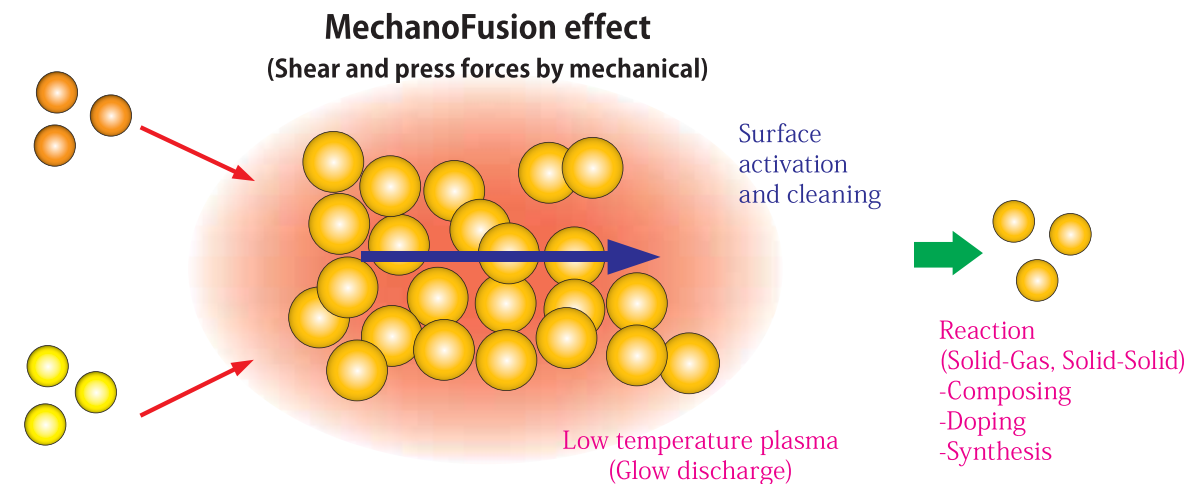


※ NC-( )P: Plasma type



## Low temperature plasma + MechanoFusion

Applying Plasma MCB to the mixture of two kinds of powders, like in the figure below, composing, doping, reaction and so on occurs. The surface of powders is cleaned and activated by plasma energy in conjunction with shear and press forces. At the same time powders are dispersed to primary particles and mixed, then occurs the chemical reaction for composing or doping between particles or with inert gas.

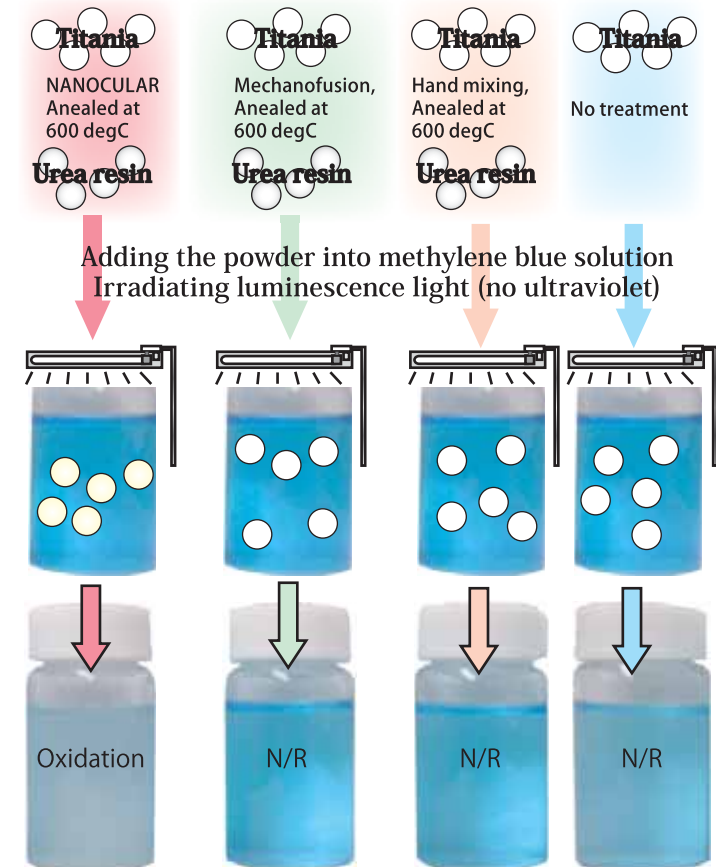


## Application examples

### Photo catalytic capability Decomposition of methylene blue under luminescence light (Color change by oxidation, Blue -> Clear)

Titania and Urea resin were composed by NANOCULAR-P, MechanoFusion and Hand mixing. Photo catalyst capability was evaluated by oxidate decomposing methylene blue solution.

The result shows the product from NANOCULAR-P only caused photo decomposition. In addition to this, nitrogen doping was confirmed by chemical analysis. Thus the powder approved generation of new particles.







New-Generation of Powder Processor for Precision Mixing and Composing Treatment Technology

## NOBILTA®

The Nobilta is the New-Generation powder processor designed to perform rapid precision mixing of macro to micro powders, surface modification to create and treat composite materials and spherulization of particles in accordance with specific requirements in one processor.



NOB-130  
Lab. Machine  
(0.5 Liters)



NOB-300  
(10 Liters)



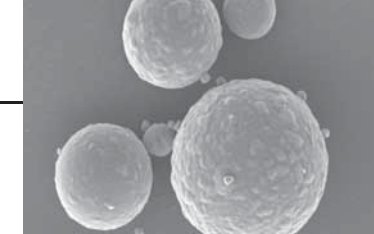
NOB-700  
Production scale  
(100 Liters)

### Features

- To process precision mixing, composition, surface modification, spherulization etc. in one machine
- To reduce operation time
- To achieve particle design in the nano range
- Process of wide range powders from nano to micronsizes
- High energy efficiency
- High suitability for difficult materials such as heat-sensitive material, abrasive material, adhesive material, etc.
- Easy to dismantle for inspection, maintenance and cleaning
- Compact, low energy consumption, low capital and operating costs

### Specification

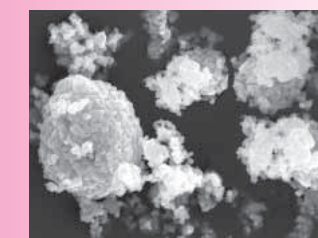
Model	NOB-130	NOB-300	NOB-450	NOB-700	NOB-1000
Motor [kW]	5.5	30	55	110	200
Rotor [Max.rpm]	6,000	2,600	1,700	1,100	780
Volume [L]	0.5	10	30	100	300
Width : W[mm]	600	800	1,700	2,000	2,800
Length : L[mm]	1,010	2,270	2,400	2,500	3,500
Height : H[mm]	550	1,260	1,600	1,700	2,300
Weight [kg]	230	1,000	3,000	5,000	10,000



### Applications

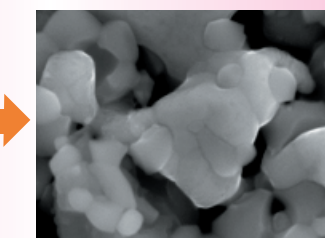
- Energy storage** Improved capability of fuel cell electrode materials and high performance separator. Improved packing density and burning ability for secondary batteries.
- Copy & Photos** Better flowability of Toner. Surface modification of carrier particles.
- Pigments** Better color tone by high dispersion
- Chemicals** Functional resin (nano filler + resin), High performance catalysts, Effective high temperature treatment
- Cosmetics** Controlled refraction, Improved flowability by surface modification
- Architecture** High resistance to environment, High temperature resistance and high intensity material, Gradient functional composite
- Environment** Improvement of catalytic performance, effective high temperature treatment and high stability to environment

#### Nickel oxide / YSZ for fuel cell materials



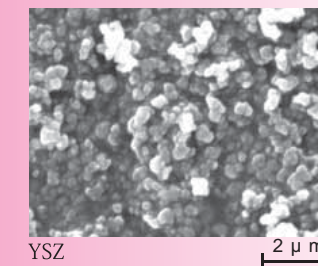
Nickel oxide

2 μm



Anode structure of composite

500nm

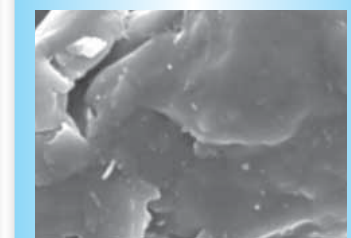


YSZ

2 μm

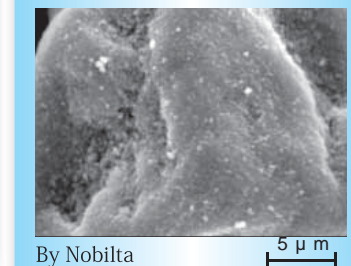
Yttria stabilized zirconia was bonded onto nickel oxide. It is realized to reduce operating temperature of SOFC due to wider interface between both materials, where the chemical reaction occurs.

#### Toner / Additives for Toner



Convention

5 μm

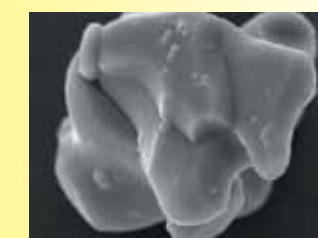


By Nobilta

5 μm

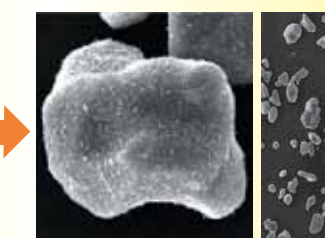
Fine additives were bonded onto toner with higher dispersion and shorter operation time against the convention. In addition to this, flowability was improved a lot.

#### Lithium cobaltate / Nano carbon for secondary batteries



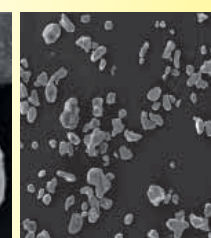
Lithium cobaltate

10 μm

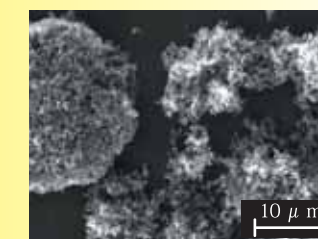


Composite

10 μm



50 μm



Nano carbon (agglomerated)

10 μm

Nano carbon was bonded onto lithium cobaltate. Inner conductivity was improved but also viscosity of slurry was reduced due to high dispersion of nano carbon. High productivity and low operating cost were achieved.

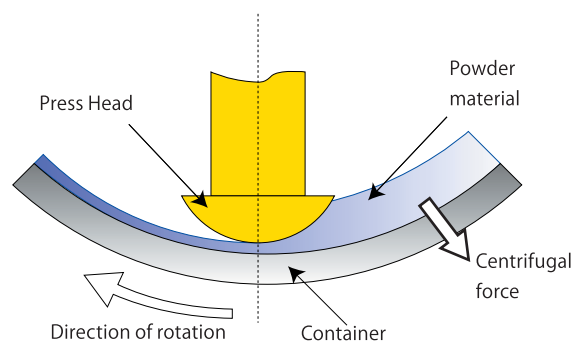




## Composite particle production system **MECHANOFUSION®**

Creation of new functional materials by mechano chemical reaction, applying mechanical energy into the mixture

Not only very fine dispersion but also composing or particle shape control can be realized. MechanoFusion has been accepted in wide range of today's market. Varieties of machine sizes are released from laboratory to production size.



Basic principle of the MechanoFusion System

### Features

Short operation time for composing and fine dispersion

-No need of drying or heating after the process

-Inert gas operation is possible

-Various machine sizes

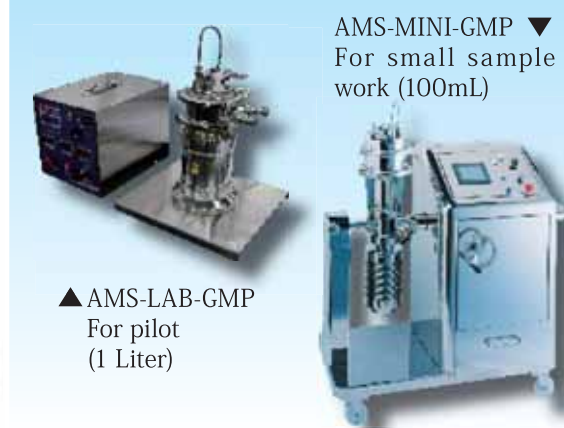
-Possible to compose abrasive materials

-Possible to control inner powder temperature, can be used for even heat sensitive materials

-Good product quality without liquid binder



### For pharmaceutical GMP application



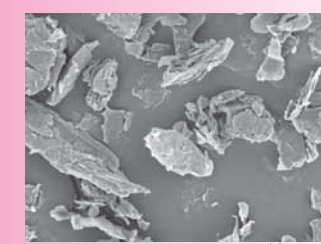
### Specification

Model	AMS-MINI	AMS-LAB	AMS-30F	AMS-60F	AMS-100F
Motor [kW]	0.75	3.7	Max 30	Max 75	Max 150
Rotor [rpm]	6,000	2,600	1,500	1,100	900
Volume [L]	0.1	1.2	20	80	200
Width : W[mm]	400	800	600	900	1,300
Length : L[mm]	700	2,270	1,200	1,900	2,900
Height : H[mm]	350	1,260	1,800	2,400	3,250
Weight [kg]	60	250	1,000	2,500	5,000

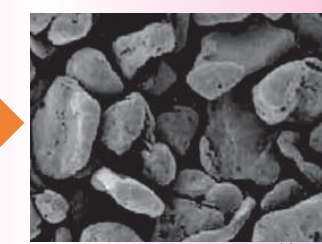
### Application

- Energy storage** Improved packing density and sintering ability for secondary battery and improved capability of fuel cell
- IT** Better flowability of Toner. High density storage memory
- Pharmaceutical** Drug Delivery System (controlled solubility, high dissolution)
- Bio** Prevention of quality change, High environmental resistance
- Chemicals** Improved characteristics and burning ability of catalysts
- Cosmetics** Controlled refraction, improved flowability by surface modification
- Pigments** Better color tone by high dispersion
- Architecture** Prevention of quality change, high resistance to environment, high temperature resistance and high intensity material, gradient functional composite
- Environment** Improved characteristics, sintering ability and high resistance to environment

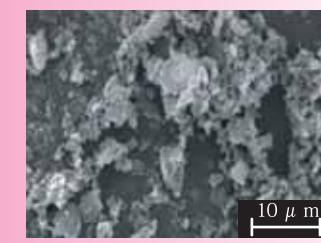
### Fuel cell (Graphite/Polymer)



Graphite fine powder 10 μm



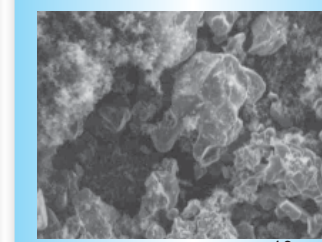
Composite 10 μm



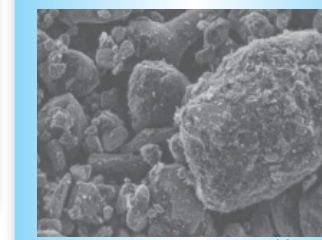
Polymer ultra-fine powder 10 μm

Surface fusion of Polymer onto Graphite particle. Sintered product of these composite particles has been applied to the separator for PEFC.

### Secondary battery (Lithium cobaltate / conductive carbon)



Conventional method 10 μm



By MechanoFusion 10 μm

There was no agglomeration by MechanoFusion against the conventional method. The electro conductivity has been improved then final battery performance will become much higher.

### Pharmaceuticals (Carrier/Drug)

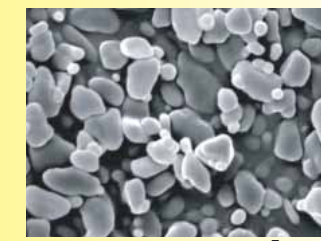


Organic carrier 20 μm



Composite 20 μm

Cross section 20 μm



Ultra-fine drug 5 μm

Surface fusion of Ultra-fine drug onto Organic carrier particle. The composite powder has good flowability and furthermore dissolution rate of the drug has been improved with high dispersion.





Multi-functional processing unit for particle design

## Faculty®



Faculty provides mechanical energy to the particles, and by separation of coarse particles and fine particles various functionalization can be achieved.

### Features

- Multi function  
Besides classification of fines, the unit can be used for various applications like sphericalzation, increase of filling quantity and high functionalization by increase of bulk density, separation of the ingredients, value adding by removal of non value ingredients.
- Reduction of process steps
- Easy operation and maintenance

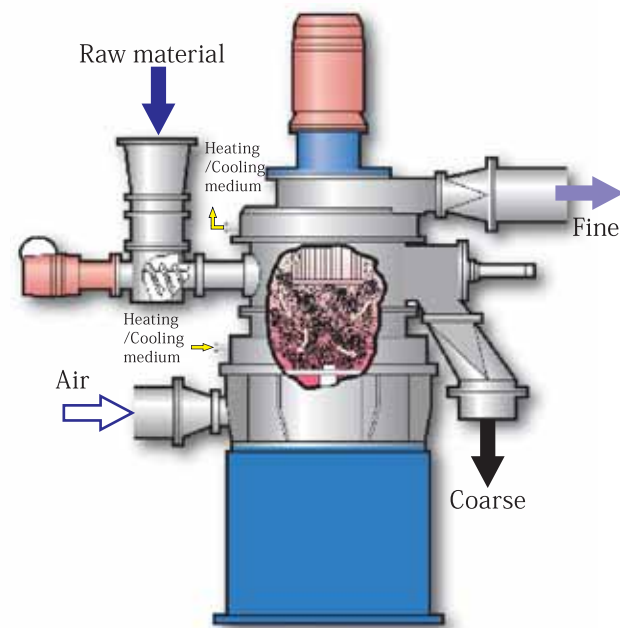


Fig.1 Construction

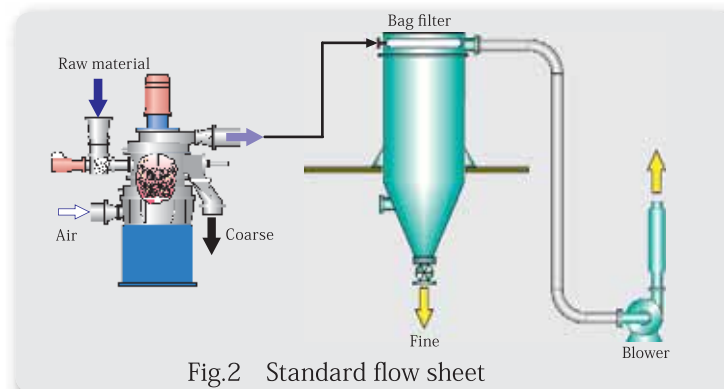


Fig.2 Standard flow sheet

### System

- (Flow sheet Fig.2, 3)
- Fig.2: Standard system by screw feeder
- Fig.3: Pneumatic feeding system (directly place Faculty into pneumatic conveying line)

### Construction

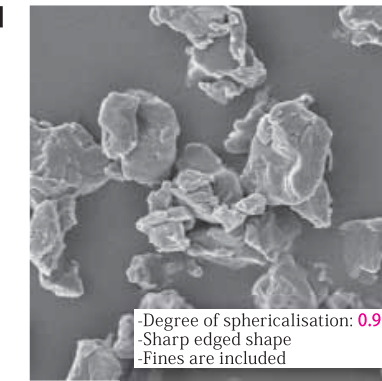
The unit is internally provided with a processing device which can give sufficient energy suited for the purpose and a high functional classifier. The center of the casing has a discharge outlet for coarse product. (Fig.1)

### Application

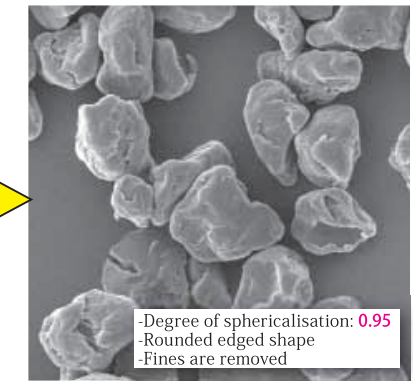
- Electric, Electronic:** Improvement of packing density by sphericalzation of secondary battery materials
- IT:** Sphericalisation and fine removal for Toner
- Foods:** Separation of ingredients
- Chemicals:** Removal of whiskers from plastic powder
- Recycling:** Removal of unburnt carbon from fly ash. Recycling of wasted building material. Recycling of printed circuit board.

### Sphericalization of the toner and removal of the fine

Sphericalization of the toner is usually done by giving hot air or giving mechanical surface treatment on the particles which removes the fine. In case of Faculty, it might use the powders which are fine-ground as the feed material. Fines removal and sphericalzation can be done at the same time.



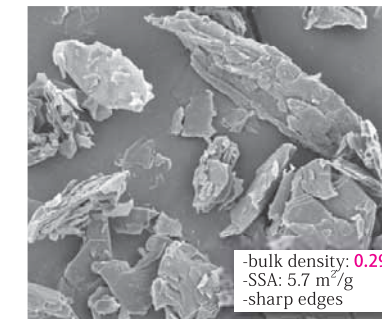
Toner:Feed material



Toner:Processed material

### Increase of filling property by increase bulk density of natural graphite and high functionalization for the battery material

Improving round shape and reducing specific surface area. Thus the bulk density has been increased, therefore very high functional battery material is obtained.



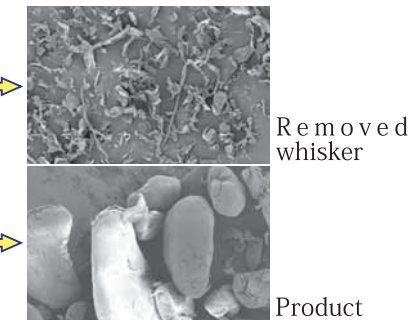
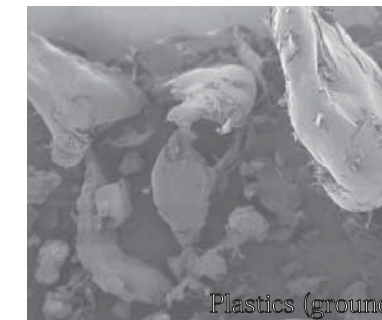
Feed of natural graphite



Product of natural graphite

### Removal of whisker of plastic

Plastic particles, which is obtained by grinding process, usually contains fibrous portion called as "whiskers". This portion often gives bad influence on the products. Faculty can remove such fibrous portion.



### Recycling of waste building material

Waste building material such as foamed urethane backed with paper, can be processed with Faculty. Papers can be removed from the coarse side, and urethane is discharged from the fine side.

### Recycling of the waste printed board

By processing the waste printed board active ingredients such as copper, can be collected.

### Specification

Model	F-LAB	F-300	F-400	F-600
Process motor [kW]	1	15	30	55
-Rotor [rpm]	22,000	8,700	6,000	4,300
Classifier motor [kW]	1	5.5	7.5	22
-Rotor [rpm]	22,000	10,250	7,300	5,200
Scale up factor [-]	-	0.5	1	2 ~ 3
Width :W[mm]	2,000	1,800	2,100	2,500
Length:L[mm]	1,300	1,600	2,500	2,500
Height:H[mm]	2,000	2,200	2,200	3,000
Weight[kg]	750	1,600	2,500	5,000



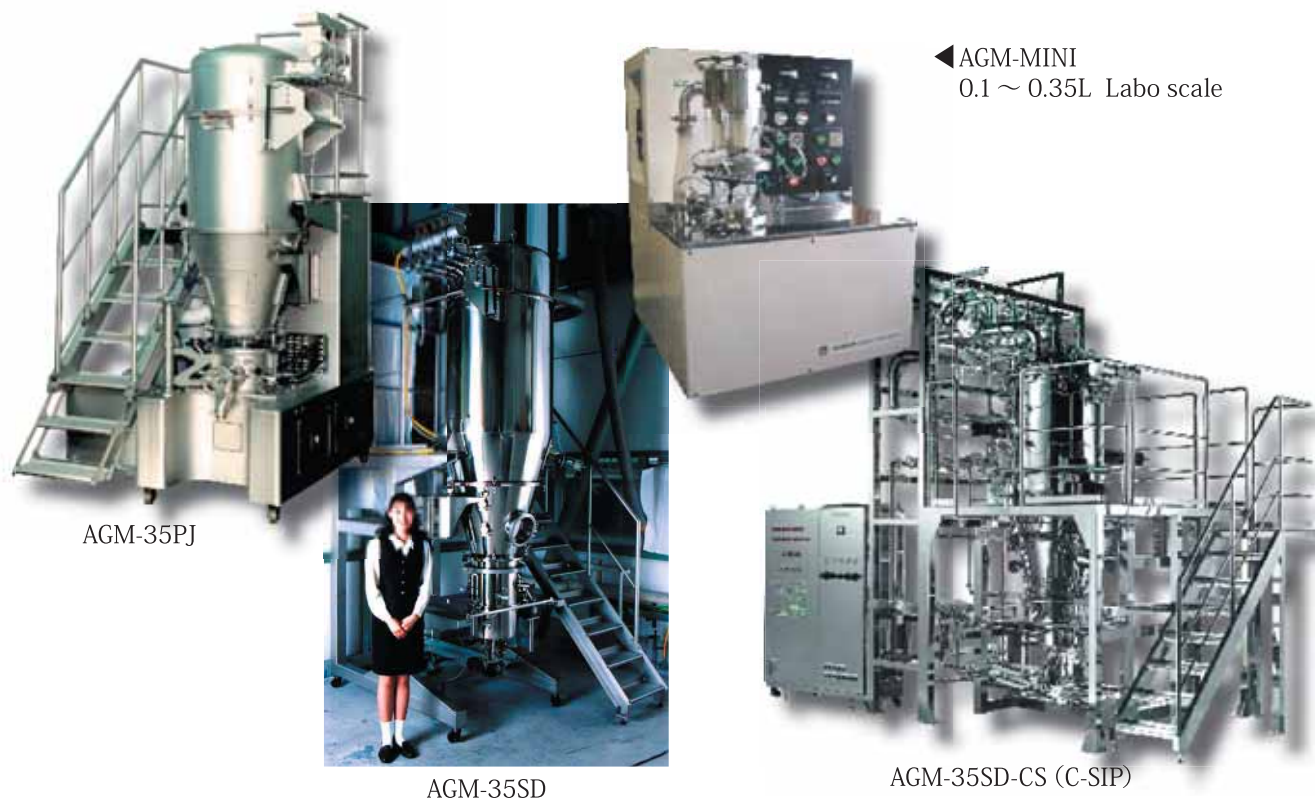


Multi-functional agglomeration unit Grinding, Agglomeration, Coating, Drying

## AGGLOMASTER®

Fine agglomeration in the micron range. Surface modification and coating of individual primary particles are possible.

Enhancing powder handling of nano powder by agglomeration to micron size.



◀ AGM-MINI  
0.1 ~ 0.35L Labo scale

### Features

- Granulation, Dispersion, Coating, Agglomeration, Drying in one unit.
- Opposed-pulse-jet achieves fine particle coating and composing by high dispersion effect.
- SD model can produce granules directly from solution. Two functions are combined in one unit; Spray drying and fluidised bed layering.
- MINI model: For laboratory size, required small volume powder, less than 200mL
- SD model can be tailored for sterilized drug production as CS model.

### Specification PJ model

Model	AGM-2PJ	25PJ	35PJ	50PJ	75PJ	100PJ	125PJ	150PJ	200PJ
Chamber volume [L]	2.5	10	30	80	230	550	850	1,250	2,200
Fluidizing air [m <sup>3</sup> /min]	3.5	7	14	32	55	90	125	220	-
Motor [kW]	0.4	1.5	2.2	3.7	7.5	15	22	30	45
Air heater capacity									
electric heater [kW]	2	6.5	12.5	-	-	-	-	-	-
steam [m <sup>3</sup> /min]	-	-	-	19,500	44,500	76,500	126,000	174,000	225,000
Spray nozzle [-]	1	1	1	2	3	3 ~ 4	4 ~ 6	4 ~ 6	4 ~ 6
Pulse jet nozzle [-]	3	3	3	5	6	8	8	8	8
Width [mm]	800	1,400	1,500	1,700	2,000	2,200	3,300	4,000	6,000
Length [mm]	1,000	1,600	1,600	1,800	2,200	2,400	3,800	4,400	7,000
Height [mm]	1,700	2,500	2,900	3,300	3,600	4,200	5,000	6,000	9,000

### Application

- Electric, Electronic** : High performance anode, cathode and separator for fuel cells, High packing density for secondary battery materials, Granulation of ferrite for molding purpose, High packing density of Barium titanate, etc.
- Foods** : Good flowability, good dissolubility, coating for cocoa, sugar, salt, starch, etc.
- Pharmaceuticals** : Agglomeration and coating for sterilized drug, lactose, corn starch, chemicals, etc.
- Chemicals** : Good flowability and wax coating for water-absorb-resin, epoxy resin, etc.

### Application examples

**Fuel cell material (PEFC, catalyst-electrolyte)**

Acetylene black + Platinum + Polymer

Nano-carbon surface supported by Platinum was coated by Polymer. Affinity to electrolyte and powder handling were improved.

Ketjen black + Platinum + Polymer

**Pharmaceutical application (Ethenzamide)**

Core particles produced by spraying agglomeration

Granule grown by Spraying & Fluidized-bed Agglomeration, layered structure

Product granule

Passing through processes, core particle generation by atomizing agglomeration and layering by fluid bed agglomeration higher bulk density powder is produced.

### Specification SD model

Model	AGM-2SD	35SD	75SD	100SD	125SD	170SD
Chamber diameter [mm]	156	350	750	1,000	1,250	1,700
Fluidizing air [m <sup>3</sup> /min]	1.2	7 ~ 12	30 ~ 50	55 ~ 90	100 ~ 170	160 ~ 220
Max. inlet air temp. [°C]	120	200	200	200	200	200
Water evap. cap. [kg/h]	~ 1.2	8 ~ 17	33 ~ 75	70 ~ 135	110 ~ 210	200 ~ 360
Bottom spray nozzle [-]	1	1 ~ 2	4	6	8	10
Width [mm]	1,000	1,600	2,600	3,000	3,000	3,400
Length [mm]	800	2,000	2,000	2,500	2,500	3,200
Height [mm]	1,700	3,600	5,100	5,700	6,300	9,300

### Specification GMP model

Model	AGM-1MP
Effective volume [L]	0.1 ~ 1.0
Fluidizing air [m <sup>3</sup> /min]	1.5
Motor [kW]	0.1
Rotation speed [rpm]	0 ~ 500
Max. inlet air temp. [°C]	100
Comp. air [L/min]	50 ~ 400
Electricity	4,000VA
Material	200V single phase Stainless steel 304
Surface finish (in-, outside)	Buff 320

### Specification AGM-MINI PJ

Model	AGM-MINI PJ
Effective volume [L]	0.1 ~ 0.35
Fluidizing air [m <sup>3</sup> /min]	Max. 0.5
Rotation speed [rpm]	80 ~ 1,600
Max. inlet air temp. [°C]	100
Comp. air [L/min]	120
Weight [kg]	250
Width [mm]	700
Length [mm]	700
Height [mm]	850
Electricity	4,000VA 200V single phase



# HOSOKAWA MICRON GROUP



Hosokawa' s globally based  
"powder processing technology" strongly supports you.

As a global trend international operations coping with local markets have been increasing. Accordingly needs to needs to follow also diversify, such like in conforming with various local regulations and guidelines. We have developed the world 3 point(Europe/USA/Asia) operational framework and offer systems corresponding with local needs, ensuring quick introduction of the most advanced technology to local market, activating human exchanges.



## OVERSEAS SUBSIDIARIES (extract)

### EUROPE

#### Germany

Hosokawa Alpine AG (Augsburg)  
Peter-Dörfler-Straße 13-25, D-86199,  
Augsburg, Germany  
Tel : +49-821-59060 Fax : +49-821-57-35-78  
e-mail: mail@alpine.hosokawa.com

Hosokawa Micron Powders GmbH (Cologne)  
Welsersstr. 9-11, 51149 Cologne, Germany  
Tel : +49-2203 3080 Fax : +49-2203 308293  
e-mail: tp@hmgmbh.hosokawa.com

Hosokawa Bepex GmbH  
Daimlerstraße8, D-74207,  
Leingarten, Germany  
Tel : +49-7131-9070 Fax : +49-7131-907301  
e-mail: compaction@bepex.hosokawa.com

#### Netherlands

Hosokawa Micron B.V.  
Gildenstraat 26, 7005 BL  
Doetinchem, Netherlands  
Tel : +31-314-37-3333 Fax : +31-314-37-3456  
e-mail : info@hmbv.hosokawa.com

#### United Kingdom

HOSOKAWA MICRON Ltd.  
Rivington Road, Whitehouse Industrial Estate Runcorn,  
Cheshire WA7 3DS, UK  
Tel : +44-(0)1928-755-100  
Fax : +44-(0)1928-714-325  
e-mail : info@hmluk.hosokawa.com

### ASIA

#### Head Office

Hosokawa Micron Corporation  
9, 1-Chome, Shoudai-Tajika, Hirakatashi,  
Osaka 573-1132 Japan  
Tel : +81-72-855-2224 Fax : +81-72-855-2679  
e-mail : info@hmc.hosokawa.com

#### Korea

Hosokawa Micron (Korea) Ltd.  
Hanshin Chamshil Core Officetel 420 11-9, Shinchon-Dong,  
Songpa-Gu Seoul, 138-733 Korea  
Tel : +82-2-420-5691 Fax : +82-2-420-5693  
e-mail : hmkorea@hosokawakorea.co.kr

#### China

Hosokawa Micron (Shanghai) Powder Machinery Co.,Ltd.  
Room 1803 COFCO Tower, No.440 Zhong Shan Road (S.2),  
Shanghai, China  
Tel : +86-21-5306-8031 Fax : +86-21-6404-7579  
e-mail : shanghai@hosokawa.com.cn

#### Malaysia

Hosokawa Micron (Malaysia) Sdn Bhd  
No.35, 1st Floor, Jalan USJ10/1G, Taipan Business Centre 47620  
UEP-Subang Jaya, Malaysia  
Tel : +60-3-5634-0391/0452  
Fax : +60-3-5634-3946  
e-mail : admin@hmm-hosokawa.com.my

#### India

Hosokawa Micron India Pvt. Ltd.  
2112, 13th Main Road, Anna Nager West, Chennai 600 040, India  
Tel : +91-44-26211-257 Fax : +91-44-26211-295

### AMERICA

#### U.S.A.

Hosokawa Micron International Inc.  
10 Chatham Road, Summit, NJ  
07901, the U.S.A.  
Tel : +1-908-277-9300  
Fax : +1-908-273-9377  
e-mail: info@hmii.hosokawa.com

Hosokawa Micron Powder Systems  
10 Chatham Road, Summit, NJ  
07901, the U.S.A.  
Tel : +1-908-273-6360  
Fax : +1-908-273-7432  
e-mail: info@hmpps.hosokawa.com

#### Canada

Hosokawa Micron Ltd. (Canada)  
9275 Highway 48, Suite 202,  
Markham, Ontario, Canada L 3P 3J3  
Tel : +1-905-471-5854  
Fax : +1-905-471-0293  
e-mail: info@hml.hosokawa.com