1. Company Profile

1-1. Admatechs Business Overview

1-2. Various size spherical silica (10nm – 30um)

1-3. Customize technology

  - Surface treatment, Slurry, Classification, PSD control

2. Technical Data

2-1. Admanano Silica Master Batch

Surface treated Admanano silica can improve Composite physical properties.

2-2. Admanano Silica Powder

Admanano powder can improve powder hardener flowability and dispersibility.
1. Company Profile

Overview of Operation

**Established** February 1990

(History)
- July 1994 New plant constructed (within TMC's Myochi Plant)
- June 1996 National Commendation for Invention (awarded the Prime Minister Prize)
- August 1999 Acquired ISO 9002 certification by the International Organization for Standardization (ISO)
- October 1999 Established system with production capacity of 300 tons per month
- May 2000 Construction of Technical Center (adjacent to TMC's biotechnology research institute)
- October 2001 Relocation of Head Office (from Tokyo to the Technical Center)

**Capital** 300 million yen: **Toyota Motor Corporation** 52.9%, **Shin-etsu Chemical Co., Ltd.** 25.6%, **Shin-Etsu Quartz Products Co., Ltd.** 15.4%, Other 6.1%

**Business activities** Manufacture and sale of oxide ceramic powders (silica, alumina, and composite oxides)

**Location** Aichi Prefecture, Japan

**President** Susumu Abe
1-1. Admatechs Product Line Up

Nano sized silica
10 nm ~ 100 nm
High Performance Nano Composite

VMC silica
0.2 μm ~ 2.0 μm
Liquid encapsulation, sub-particles for EMC

Flame fused spherical silica
5 μm ~ 30 μm
Main particles for EMC
1-1. Process Flow of Admatechs Products

**Admanano**
- Silicon compound
  - Build up process
  - Sol-gel process
  - Nano-sized silica in water
  - Modified by silane agent
  - Powder, Slurry type and resin master batch product

**Admafine**
- Metal silicon
  - Oxidation in vapor
  - And got spherical
  - VMC process (Vaporized Metal Combustion)
  - Spherical silica (Admafine silica)
  - Surface treatment
  - Dispersion
  - Classification
  - Slurry type product

**Admafuse**
- Crushed silica
  - Break down Process
  - Melt surface
  - And got spherical
  - Flame fusing process
  - Flame fused silica
  - Surface treatment
  - Classification
  - Powder type product
1-1. Application Example of Admatechs Products

Electronic Device

- A6 : Application Processor
- Cross Section
- Mold
- Under Fill
- Substrate
- Layer

Black thing is encapsulation material

Si Chip
Solder bump
Glass Cloth
Cupper layer

Admafuse : 5um silica

Admafine : 0.5um silica

iPhone
1-1. Application Example of Admatechs Products

Thermal Interface Material

- Thermally Conductive Sheet
- Thermally Conductive Grease
- Admafine Alumina: 0.6µm, 10µm

- High Thermal Conductivity.
- Low Viscosity, High Flexibility.
1-1. Application Example of Admatechs Products

**OLED**

- **Glass Substrate (Traditional Rigid Substrate)**
- **PI Film (Flexible Transparency Substrate)**

**Admanano**: 50nm silica

- Reduce CTE, improve physical properties
- High Transparency due to nano size and no agglomeration.
1-1. Application Example of Admatech Products

3D Printer

Fused Deposition Modeling (FDM)

ABS, PLA, Other resin

Stereo lithography (SLA)

Acryl, Other Resin

Admafuse : 5um silica  Admafine : 0.5um silica

- Low Viscosity.
- Reduce CTE,
  Improve physical properties.
1-2. Various Size Spherical Silica

Admanano Manufacturing Process (10 – 100nm)

Characteristics of Admanano

- High purity
- Non-aggregation
- Low viscosity
- High transparency

Surface Treatment

Purification

Impurity removal (Na⁺, K⁺, etc.)

Drying

Powder Product

Dispersed Product

Slurry or Master batch Product
1-2. Various Size Spherical Silica
Admanano Silica Line Up

10nm

50nm

100nm

Particle size /μm

Frequency /%

Accumulation %
1-2. Various Size Spherical Silica
Admanano Silica Optical Property

10nm  15nm  50nm  300nm

Thickness: ca.5mm

fine ↔ Particle Size ↔ coarse
High ↔ Transparency ↔ Low
Core technology of ADMATECHS is **Vaporized Metal Combustion (VMC) method.** The VMC method provides fine spherical silica and alumina particles from metal powder by direct oxidation.
1-2. Various Size Spherical Silica
Admafine Product Line Up

Particles size distribution and SEM Images

- **SO-E1**
  - Particle diameter: 0.3 μm
  - Specific surface area: 10 ~ 20 m²/g

- **SO-E2**
  - Particle diameter: 0.5 μm
  - Specific surface area: 5 ~ 9 m²/g

- **SO-E4**
  - Particle diameter: 1 μm
  - Specific surface area: 3 ~ 6 m²/g

- **SO-E5**
  - Particle diameter: 1.5 μm
  - Specific surface area: 2 ~ 5 m²/g
1-2. Various Size Spherical Silica

Admafuse Manufacturing Process (5 – 30um)

- Crushed Silica
- Furnace
- Cyclone
- Bag filter
- Mixing
- Surface treatment
- Classification
  - Remove coarse particle

Spherical Silica
6μm, 10μm, 30μm

- High circularity
- High purity
- High flow & low viscosity
1-2. Various Size Spherical Silica
Admafuse Product Line Up

Product name

<table>
<thead>
<tr>
<th>FE9-</th>
<th>FEB-</th>
<th>FED-</th>
<th>FEF-</th>
</tr>
</thead>
<tbody>
<tr>
<td>6µm</td>
<td>10µm</td>
<td>20µm</td>
<td>30µm</td>
</tr>
</tbody>
</table>
1-3. Customize Technology
- Surface Treatment Technology, “SQ Treatment”.

<SQ Treatment Concept>

Characteristics
1) Low surface reactivity toward epoxy group
2) Low agglomeration
3) Low adhesion to wall of apparatus
4) Easy to disperse into resin

Fig. FT-IR spectra

- 1. Initial silica surface
- 2. SQ treatment

Absorbance vs. Wavenumber / cm$^{-1}$

1. Initial silica surface
2. SQ treatment
Silica surface modified with silane coupling agent are beneficial for:

1. Low resin viscosity
2. Less agglomeration
3. Better compatibility with epoxy resin

**Admatechs Surface Treated Silica**

- Monolayer silane bonded chemically to silica surface
- Outside layer silane absorbed physically

**Viscosity Data**

<table>
<thead>
<tr>
<th></th>
<th>Bis F + Bis A epoxy resin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resin</td>
<td></td>
</tr>
<tr>
<td>Silica</td>
<td>0.5μm silica</td>
</tr>
<tr>
<td>Loading</td>
<td>65wt%</td>
</tr>
</tbody>
</table>

Share rate at 1 (1/sec)

Surface treatment improves the compatibility with resin and reduces the viscosity.
Surface treatment improves the adhesion between silica surface and resin. This result improves physical properties of compounds.
Various surface treatment agents are available.

<table>
<thead>
<tr>
<th>Chemical Structure</th>
<th>Name</th>
<th>Chemical Structure</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>(CH₃O)₂Si(CH₃)₂</td>
<td>Dimethyl silane</td>
<td>( \text{CH}_3 ) ( \begin{array}{c} \text{O} \ (\text{CH}_3\text{O})_2\text{SiC}_3\text{H}_6\text{OCH}_2\text{CH}-\text{CH}_2 \end{array} )</td>
<td>Epoxy silane</td>
</tr>
<tr>
<td>(CH₃O)₃Si(CH₂)₅CH₃</td>
<td>Hexyl silane</td>
<td>( (\text{CH}_3\text{O})_3\text{SiC}_3\text{H}_6\text{NH} )</td>
<td>Phenyl amino Silane</td>
</tr>
<tr>
<td>(CH₃O)₃SiC₆H₅</td>
<td>Phenyl silane</td>
<td>( (\text{CH}_3\text{O})_3\text{SiC}_3\text{H}_6\text{OCC}-\text{CH}_2 )</td>
<td>Methacryl silane</td>
</tr>
<tr>
<td>(CH₃O)₃SiCH═CH₂</td>
<td>Vinyl silane</td>
<td>( (\text{C}_2\text{H}_5\text{O})_3\text{SiC}_3\text{H}_6\text{N=C}=\text{O} )</td>
<td>Isocyanate silane</td>
</tr>
</tbody>
</table>
1-3. Customize Technology

Slurry Production Technology (For Admafine)

Japan patent #3920582 and more patents under application screening.

Admafine slurry production scheme

Silica production technology → Surface modification technology → Dispersion technology → Classification technology → Admafine slurry (filler for substrate)

Agglomeration control
High silica loading (>70wt%)

Filtration by screening (5um)

Photo1. Bad dispersion slurry
Photo2. Good dispersion slurry
Photo3. Slurry containing Large particles
Photo4. No large particles found in slurry
Photographs of 0.3μm particle size silica slurries (×1000)

at 5μm (containing 100ppm > 5μm particle)

at 3μm (containing 10ppm > 3μm)
1-3. Customize Technology

Control of Particle Size Distribution

<CLOSEST PACKING CONCEPT>

1) Combination of bigger particle and smaller particle
2) Submicron size & Spherical shape

**Resin Viscosity**

Resin : Liquid Epoxy resin (BisA & BisF mixed)
Filler : 5um silica (FE975A)
        : 0.5um silica (SC200G-SQV)
Loading : 80wt%

- Combination of bigger particle and smaller particle
- Submicron size & Spherical shape

Closest Packing can improve the compound viscosity.
The product can be developed according to customer’s demand by Admatechs.

Fused silica (2～30 μm)
Admafine silica (0.2～2 μm)

Control of Particle Size Distribution

Input: customer’s information

- Particle diameter
- SSA
- Silica loading
- Classification
  - Remove coarse particle
- Surface treatment
  - (Resin information)

Base silica

Customized silica
1. Company Profile

1-1. Admatechs Business Overview

1-2. Various size spherical silica (10nm – 30um)

1-3. Customize technology

• Surface treatment, Slurry, Classification, PSD control

2. Technical Data

2-1. Admanano Silica Master Batch

Surface treated Admanano silica can improve CFRP physical properties.

2-2. Admanano Silica Powder

Admanano powder can improve powder hardener flowability and dispersibility.
2-1. Admanano Silica Master Batch -
Effect of Admanano for Resin – Physical Properties

Features of Admanano Master Batch

- Uniformly surface treated spherical nano silica.
- Admanano silica can be dispersed in various resin system uniformly.
- Surface treated silica can react with resin system.

Physical Properties

<table>
<thead>
<tr>
<th>Resin</th>
<th>Bis F epoxy Resin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admanano</td>
<td>10nm epoxy treated silica</td>
</tr>
<tr>
<td>Loading</td>
<td>15wt%</td>
</tr>
<tr>
<td>Hardener</td>
<td>Aromatic diamine</td>
</tr>
<tr>
<td>Curing Condition</td>
<td>170°C, 2 hrs</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Items</th>
<th>Flexural Strength (MPa)</th>
<th>Young’s modulus (GPa)</th>
<th>Flexural Strength (MPa)</th>
<th>Young’s modulus (GPa)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>20°C</td>
<td>20°C</td>
<td>140°C</td>
<td>140°C</td>
</tr>
<tr>
<td>Neat epoxy resin</td>
<td>88</td>
<td>3.1</td>
<td>20</td>
<td>0.5</td>
</tr>
<tr>
<td>Addition of Admanano</td>
<td>141</td>
<td>4.5</td>
<td>31</td>
<td>1.1</td>
</tr>
</tbody>
</table>

Each physical property was improved using Admanano Master Batch
**Fracture Toughness**

- Resin: Bis F epoxy resin mixture
- Micro Silica: 0.5μm epoxy treated silica
- Admanano: 50nm epoxy treated silica
- Loading: 40wt%
- Hardener: Aromatic diamine
- Curing Condition: 170°C, 2 hrs.

<table>
<thead>
<tr>
<th>Items</th>
<th>Fracture Toughness $K_{IC}$ (@25°C) MPa·m$^{0.5}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Micro Silica 40wt%</td>
<td>2.38</td>
</tr>
<tr>
<td>Micro Silica 30wt%</td>
<td>2.61</td>
</tr>
<tr>
<td>Admanano 10wt%</td>
<td></td>
</tr>
</tbody>
</table>

Fracture Toughness was also improved using Admanano.

**CTE Properties**

- Resin: Bis A + Bis F epoxy Resin
- Silica: 1.5μm, 0.5μm, 50nm Epoxy treated silica
- Loading: 40wt%
- Hardener: Aromatic diamine
- Curing Condition: 170°C, 2 hrs

<table>
<thead>
<tr>
<th>CTE</th>
<th>Control Resin</th>
<th>Silica Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1.5μm</td>
</tr>
<tr>
<td>CTE1 (0-50C)</td>
<td>64</td>
<td>44</td>
</tr>
<tr>
<td>CTE2 (175-195C)</td>
<td>187</td>
<td>135</td>
</tr>
<tr>
<td>Tg</td>
<td>152</td>
<td>152</td>
</tr>
</tbody>
</table>

50nm silica can also reduce CTE as well.
1st Evaluation of CFRP using surface treated Admanano Silica

<table>
<thead>
<tr>
<th></th>
<th>Flexure Strength (MPa)</th>
<th>Flexure Modulus (GPa)</th>
<th>Tensile Strength (MPa)</th>
<th>Tensile Modulus (GPa)</th>
<th>ILSS (MPa)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CFRP</td>
<td>999</td>
<td>65</td>
<td>804</td>
<td>68</td>
<td>75</td>
</tr>
<tr>
<td>CFRP + Admanano</td>
<td>1135</td>
<td>69</td>
<td>971</td>
<td>79</td>
<td>80</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Z axis CTE</th>
<th>CTE1 (0-50°C) (ppm/K)</th>
<th>CTE2 (175-195°C) (ppm/K)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CFRP</td>
<td>39</td>
<td>211</td>
</tr>
<tr>
<td>CFRP + Admanano</td>
<td>35</td>
<td>182</td>
</tr>
</tbody>
</table>

In addition to reducing CTE, Admanano can improve CFRP strength, modulus and ILSS by 5~20%
50nm Admanano silica is dispersed inside CFRP uniformly.
2-1. Admanano Silica Master Batch - Effect of Admanano for CFRP – Physical Data

2nd Evaluation of CFRP using surface treated Admanano Silica

CF : T700 12K (Toray)
CF Loading : 55vol%
Resin : Bis A epoxy Resin
Admanano : 50nm epoxy + more functional treated silica (YA050A-JFZ)
Silica Loading : 15wt% for resin
Number of CF layer
: 8 layers (Except ILSS)
: 14 layers for ILSS
Hardener : DDS (0.9 for resin)
Curing Condition : Press molding
0.3Mpa, 100°C/2hr, 180°C/4hr

Every physical property was improved by 5~20%. Tg was decreased from 200°C to 180°C in this case.
Every physical property was improved by 15~26%. Tg was no change from base resin in this case.
Dispersibility on Powder Surface

"Admanano" onto PS beads (0.5%)

"Fumed Silica" onto PS beads (0.5%)

Admanano can improve the powder flowability compared to fumed silica.
2-2. Admanano Silica Powder - Dispersibility in Organic Solvent

Admanano Powder + Solvent Shaking by hands

Admanano powder can be dispersed in organic solvent without any dispersers

Ex. Average particle size: 10nm
Surface treatment: Methacryl silane
Solvent: MEK
Silica loading: 50wt%
2-2. Admanano Silica Powder-Powder Flowability Improvement

**Without Admanano**

- Spherical silica (0.5µm)
- Pigment (0.05~0.2µm) 3%

**With Admanano**

- Spherical silica (0.5µm) + Admanano 0.3%
- Pigment (0.05~0.2µm) 3%
2-2. Admanano Silica Powder-
Effect of Admanano for Powder Hardener (DICY)

**Powder Flowability**

<table>
<thead>
<tr>
<th>Sample</th>
<th>Flowability Energy (mJ) ※</th>
</tr>
</thead>
<tbody>
<tr>
<td>DICY</td>
<td>400</td>
</tr>
<tr>
<td>DICY + Admanano</td>
<td>100</td>
</tr>
</tbody>
</table>

※Smaller value means high flowability.

Admanano improves the powder flowability of DICY Significantly.

**Dispersibility into Resin**

<table>
<thead>
<tr>
<th>Resin</th>
<th>Liquid Epoxy Resin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardener</td>
<td>DICY</td>
</tr>
<tr>
<td>Admanano</td>
<td>YA010C-SP3 (10nm)</td>
</tr>
<tr>
<td>Loading</td>
<td>5wt%</td>
</tr>
<tr>
<td>Mixing Method</td>
<td>Planetary Mill</td>
</tr>
</tbody>
</table>

2000rpm, 2min

Admanano can improve the dispersibility of DICY Significantly.
2-2. Admanano Silica Powder-Effect of Admanano for Powder Hardener (DDS)

**Efficiency of Screening**

<table>
<thead>
<tr>
<th>Hardener</th>
<th>DDS, 4um diameter</th>
<th>Admanano</th>
<th>YA010C-SP3 (10nm)</th>
<th>1wt% for DDS</th>
<th>Mixing Method</th>
<th>Shaking by Hand</th>
<th>Vibrating Sieve Machine</th>
<th>425um mesh</th>
<th>Humidification</th>
<th>40 °C, 80%RH, 12 days</th>
<th>Pressurization</th>
<th>5kg, 1day</th>
<th>Evaluation Method</th>
<th>DDS 1g was placed on a sieve, then screened for 3min. After Sieving, the weight of residue was measured.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Only DDS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>DDS got agglomeration because of aging or their own weight, then it became harder to sieve. On the other hand, Admanano could avoid agglomeration, so the sieve efficiency was improved.</td>
</tr>
<tr>
<td>Sieve Efficiency(%)</td>
<td>27</td>
<td>12</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
- Summary -

- Various Size Silica Fillers and Customize Technology
  Admatechs can supply various customized silica filler based on demand.

- Admanano Silica Master Batch
  Surface treated Admanano silica can improve CFRP physical properties.

- Admanano Silica Powder
  Admanano can improve powder flowability and dispersibility.

Thank you!
### Adamanano Product Line Up

<table>
<thead>
<tr>
<th>Purity</th>
<th>Particle Size (nm)</th>
<th>SSA (m2/g)</th>
<th>Surface Treatment</th>
<th>Solvent Contents</th>
<th>Resin</th>
<th>SiO₂ Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>High purity type</td>
<td>10</td>
<td>300</td>
<td>YA010C-SP3</td>
<td>MEK</td>
<td>Epoxy resin</td>
<td>20-60 wt%</td>
</tr>
<tr>
<td>(Standard)</td>
<td>50</td>
<td>60</td>
<td>YA050C-SP3</td>
<td>MIBK PGM Cyclohexanone, etc.</td>
<td>Acryl resin , etc.</td>
<td>20-60 wt%</td>
</tr>
<tr>
<td></td>
<td>100</td>
<td>30</td>
<td>YC100C-SP3</td>
<td>20-60 wt%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

※NOTE: This table shows "available products" including grades which are under development.

- 10nm
- 50nm
- 100nm
# Admanano Epoxy Resin Master Batch Product Line Up

<table>
<thead>
<tr>
<th>Product Name※1</th>
<th>Diameter※2</th>
<th>Surface treatment</th>
<th>Silica Loading</th>
<th>Epoxy Resin Type</th>
<th>EEW</th>
</tr>
</thead>
<tbody>
<tr>
<td>YA010A-JEW</td>
<td>10nm</td>
<td>Epoxy</td>
<td>20wt%</td>
<td>Bis Phenol F (High Purity Type)</td>
<td>230g/mol</td>
</tr>
<tr>
<td>YA050A-JEW</td>
<td>50nm</td>
<td></td>
<td>50wt%</td>
<td></td>
<td>370g/mol</td>
</tr>
<tr>
<td>YA010A-JGY</td>
<td>10nm</td>
<td>Epoxy</td>
<td>25wt%</td>
<td>Bis Phenol F (Standard Type)</td>
<td>270g/mol</td>
</tr>
<tr>
<td>YA050A-JGY</td>
<td>50nm</td>
<td></td>
<td>50wt%</td>
<td></td>
<td>440g/mol</td>
</tr>
<tr>
<td>YA010A-JFL</td>
<td>10nm</td>
<td>Epoxy</td>
<td>20wt%</td>
<td>Bis Phenol A</td>
<td>260g/mol</td>
</tr>
<tr>
<td>YA050A-JFL</td>
<td>50nm</td>
<td></td>
<td>40wt%</td>
<td></td>
<td>360g/mol</td>
</tr>
<tr>
<td>YA010A-JFZ</td>
<td>10nm</td>
<td>Epoxy + More Functional Treatment</td>
<td>20wt%</td>
<td>Bis Phenol A</td>
<td>270g/mol</td>
</tr>
<tr>
<td>YA050A-JFZ</td>
<td>50nm</td>
<td></td>
<td>40wt%</td>
<td></td>
<td>360g/mol</td>
</tr>
<tr>
<td>YA010A-JFS</td>
<td>10nm</td>
<td>Epoxy</td>
<td>20wt%</td>
<td>Alicyclic</td>
<td>180g/mol</td>
</tr>
</tbody>
</table>

※1 These products line up contain under development ones.
※2 Average diameter was calculated from SSA.

Admatechs can try various resin master batch based on customer request.
<table>
<thead>
<tr>
<th>Purity</th>
<th>Basic Grade</th>
<th>Particle Size (µm)</th>
<th>SSA (m²/g)</th>
<th>Cut Level</th>
<th>Surface Treatment Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;99.0%</td>
<td>SC2000-SQV</td>
<td>0.5</td>
<td>6.0</td>
<td>SC2000-SQV</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>SC5000-SQV</td>
<td>1.2</td>
<td>4.5</td>
<td>SC5000-SQV</td>
<td>-</td>
</tr>
<tr>
<td>&gt;99.8%</td>
<td>SO-C1</td>
<td>0.3</td>
<td>10.0</td>
<td>SC1000-</td>
<td>SO</td>
</tr>
<tr>
<td></td>
<td>SO-C2</td>
<td>0.5</td>
<td>6.0</td>
<td>SC2000-</td>
<td>SO</td>
</tr>
<tr>
<td></td>
<td>SO-C4</td>
<td>1.1</td>
<td>4.5</td>
<td>SC4000-</td>
<td>SO</td>
</tr>
<tr>
<td></td>
<td>SO-C5</td>
<td>1.5</td>
<td>4.0</td>
<td>SC5000-</td>
<td>SO</td>
</tr>
</tbody>
</table>

※NOTE: This table shows "available products" including grades which are under development.
## Admafine Silica Line Up for Electronics

<table>
<thead>
<tr>
<th>Purity</th>
<th>Basic Grade</th>
<th>Particle Size (µm)</th>
<th>SSA (m2/g)</th>
<th>Cut Level</th>
<th>Surface Treatment Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>45µm</td>
<td>25µm</td>
</tr>
<tr>
<td>Regular type (Purity &gt;99.8%)</td>
<td>SO-C1</td>
<td>0.3</td>
<td>10.0</td>
<td>SC1500</td>
<td>SC1200</td>
</tr>
<tr>
<td></td>
<td>SO-C2</td>
<td>0.5</td>
<td>6.0</td>
<td>SC2500</td>
<td>SC2200</td>
</tr>
<tr>
<td></td>
<td>SO-C4</td>
<td>1.1</td>
<td>4.5</td>
<td>SC4500</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>SO-C5</td>
<td>1.5</td>
<td>4.0</td>
<td>SC5500</td>
<td>SC5200</td>
</tr>
<tr>
<td></td>
<td>SO-E1</td>
<td>0.3</td>
<td>15.0</td>
<td>SE1500</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>SO-E2</td>
<td>0.5</td>
<td>6.0</td>
<td>SE2500</td>
<td>SE2200</td>
</tr>
<tr>
<td></td>
<td>SO-E4</td>
<td>1.0</td>
<td>4.5</td>
<td>SE4500</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>SO-E5</td>
<td>1.5</td>
<td>4.5</td>
<td>SE5500</td>
<td>SE5200</td>
</tr>
<tr>
<td></td>
<td>SO-E6</td>
<td>2.0</td>
<td>2.0</td>
<td>-</td>
<td>SE6200</td>
</tr>
</tbody>
</table>

※NOTE: This table shows "available products” including grades which are under development.
### Admafine Silica Slurry Line Up

<table>
<thead>
<tr>
<th>Purity</th>
<th>Particle Size (µm)</th>
<th>SSA (m²/g)</th>
<th>Cut Level</th>
<th>Treatment</th>
<th>Solvent</th>
<th>Standard SiO₂ contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regular type (Purity &gt;99.8%)</td>
<td>0.3</td>
<td>10.0</td>
<td>SC1050</td>
<td>Regular</td>
<td>MEK</td>
<td>50〜70wt%</td>
</tr>
<tr>
<td></td>
<td>0.5</td>
<td>6.0</td>
<td>SC2050</td>
<td>Epoxy</td>
<td>MIBK</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.1</td>
<td>4.5</td>
<td>SC4050</td>
<td>Vinyl</td>
<td>Cyclohexanone, etc.</td>
<td></td>
</tr>
<tr>
<td>High purity type (Purity &gt;99.9%, Low α)</td>
<td>0.3</td>
<td>15.0</td>
<td>SE1050</td>
<td>Phenyl</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.5</td>
<td>6.0</td>
<td>SE2050</td>
<td>Phenyl Amino, etc.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.0</td>
<td>4.5</td>
<td>SE4050</td>
<td>Metacryl</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

※NOTE: This table shows "available products" including grades which are under development.
# Admafuse Line Up

<table>
<thead>
<tr>
<th>Purity</th>
<th>Basic Grade</th>
<th>Particle Size (µm)</th>
<th>SSA (m²/g)</th>
<th>Cut Level</th>
<th>Surface Treatment Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FE9 series</td>
<td>~ 8</td>
<td>2.0 ~</td>
<td>FE975A</td>
<td>FE925A</td>
</tr>
<tr>
<td></td>
<td>FEB series</td>
<td>~ 15</td>
<td>1.0 ~</td>
<td>FEB75A</td>
<td>FEB25A</td>
</tr>
<tr>
<td></td>
<td>FED series</td>
<td>~ 25</td>
<td>1.0 ~</td>
<td>FED75A</td>
<td>FED45A</td>
</tr>
<tr>
<td></td>
<td>FEF series</td>
<td>~ 35</td>
<td>1.0 ~</td>
<td>FEF75A</td>
<td>-</td>
</tr>
</tbody>
</table>

※NOTE: This table shows "available products" including grades which are under development.
※We can provide a product designed for close packing. (PSD and SSA are customizable.)

<table>
<thead>
<tr>
<th>FE9-</th>
<th>FEB-</th>
<th>FED-</th>
<th>FEF-</th>
</tr>
</thead>
</table>

![Graphs](image-url)
# Admafine Alumina Line Up

<table>
<thead>
<tr>
<th>Purity</th>
<th>Basic Grade</th>
<th>Particle Size (µm)</th>
<th>SSA (m2/g)</th>
<th>Cut Level</th>
<th>Surface Treatment Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>75µm</td>
<td>45µm</td>
</tr>
<tr>
<td>Regular type (Purity &gt;99.8%)</td>
<td>AO-502</td>
<td>0.6</td>
<td>7.5</td>
<td>AC2000</td>
<td>AC2500</td>
</tr>
<tr>
<td></td>
<td>AO-506</td>
<td>6</td>
<td>2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>AO-509</td>
<td>10</td>
<td>2</td>
<td>AC9000</td>
<td>AC9500</td>
</tr>
<tr>
<td>Low α ray type (Purity &gt;99.9%)</td>
<td>AG2050</td>
<td>0.6</td>
<td>7.0</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>AG9200</td>
<td>6</td>
<td>3.5</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

※ NOTE: This table shows "available products" including grades which are under development.

AO-502 (0.6 µm)  

AO-506 (6 µm)  

AO-509 (10 µm)  

![Particle Diameter Distribution for AO-502](image)  

![Particle Diameter Distribution for AO-506](image)  

![Particle Diameter Distribution for AO-509](image)