

Aluminum Nitride substrate



The best thermal conductivity of **250W/mk**

● Feature

- Thermal conductivity **250W/mk**
- Thermal expansion coefficient matched to silicon (Si)
- High thermal shock resistance and high reliability against rapid heating and cooling
- High electrical insulation, low dielectric constant
- Applicable for large areas, thicker than 1mm, and small lots. Surface roughness from $Ra=1\mu m$ to mirror surface.

● Specifications

- Outer dimension (max.) □200(mm)
- Plate thickness 0.25 to 1(mm)
- Surface roughness $Ra \leq 0.8(\mu m)$
- Laser processing: Available on request

● Special Characteristic

Special Characteristic \ Grade		FAN-170	FAN-200	FAN-250
Thermal Conductivity	W/m·K (RT)	170	200	250
Thermal Emissivity	(100°C)	0.93		
Thermal Expansion Coefficient	$10^{-6}/^{\circ}C$ (RT~400°C)	4.5		
Insulation Resistance	$\Omega \cdot cm$ (RT)	$>10^{13}$		
Dielectric Strength	kV/mm (RT)	15		
Dielectric Constant	(1MHz)	8.8		
Dielectric Loss	10^{-4} (1MHz)	5		
Bending Strength	MPa	350		
Density	g/cm^3	3.3		
Yttrium	%	3.4		

Matsuo Sangyo Co., Ltd.



Advanced Technology Division Masaki Matsumoto

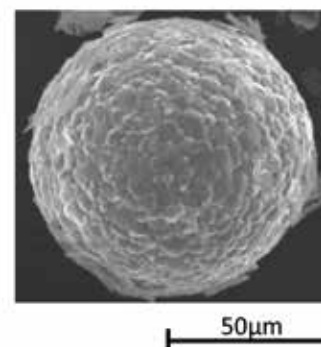
5F Midosuji Honmachi Bldg., 3-5-7 Honmachi, Chuo-ku, Osaka 541-0053, Japan

TEL : +81-6-6261-1226 Email : masaky@matsuo-sangyo.co.jp

Aluminum Nitride filler



Particle shape (ex : FAN-f80-A1)



AlN filler, composed by high-temperature sintering of high thermal conductivity AlN fine powder with a small amount of sintering aid Y₂O₃ and particle size control agent BN, has excellent filling and flowability for various resins such as epoxy resin, silicone resin and BT resin, and realizes high heat dissipation.

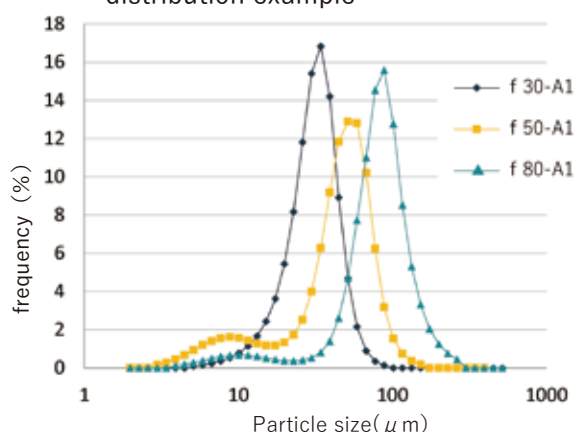
● Application

- Resins for semiconductor encapsulation
- Heat dissipation sheet

● Feature

- Insulation & High Thermal Conductivity
- spherical particle
- high fill factor

AlN filler FANf series particle size distribution example



● Characterization

※Representative value

Grade		FAN- f 05-A1	FAN- f 30-A1	FAN- f 50-A1	FAN- f 80-A1
Component		AlN(Minor Additives Y2O3,BN)			
Particle Shape		Polyhedral Grain	Orbicular		
Thermal Conductivity	W/m・K(RT)	170 (Sintered Body)			
Insulation resistance	Ω・cm(RT)	>10 ¹³ (Sintered Body)			
Density	g/cm ³	3.3 (Sintered Body)			
Average Particle Size	μ m	3~10	20~40	35~65	65~90
	D10	3	15	20	30
	D90	8	50	95	150
Remarks		Primary Particle Size	< 200mesh		

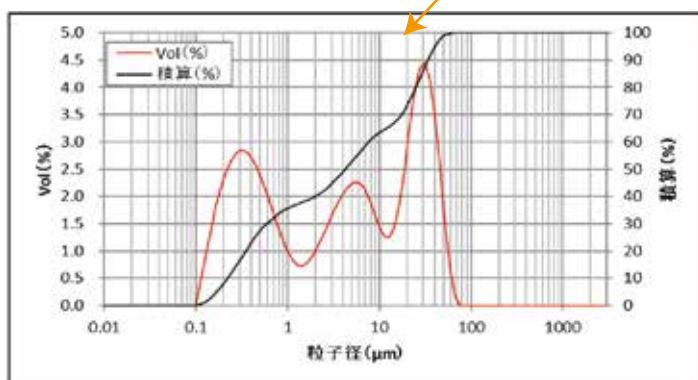
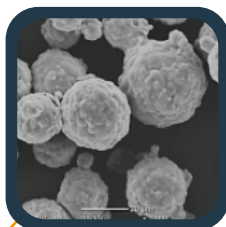
“Blend filler” for insulation/thermal conductive sheets

The FN Series blend filler is composed mainly of Aluminum Nitride ceramic filler, which has high thermal conductivity and large spherical particle size, blended with other ceramic fillers in a unique ratio. It can be blended with silicone and epoxy resins to produce sheets, gels, and adhesives with particularly excellent heat dissipation properties.

● Characteristics (product grade and particle size distribution)

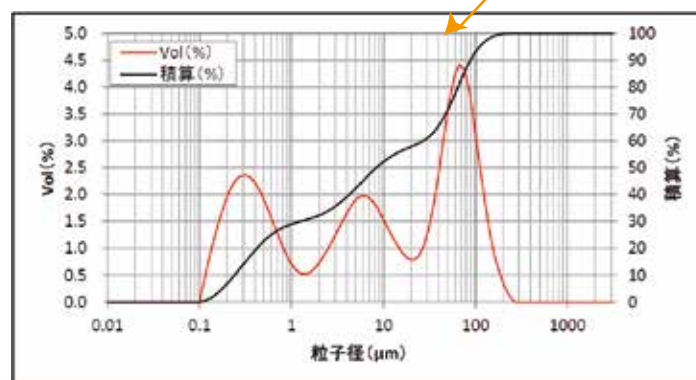
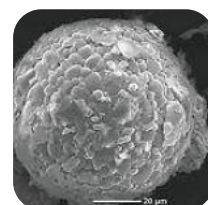
Blend filler :
FN-001-P grade

AlN filler :
30 μm



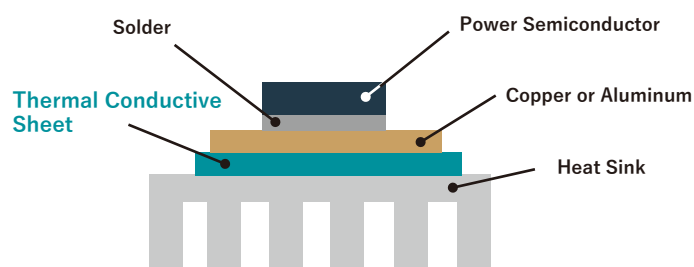
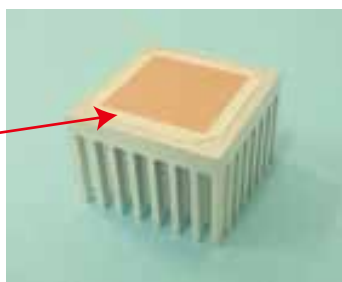
Blend filler :
FN-005-Pgrade

AlN filler :
80 μm



● Application

For cooling power semiconductor, High luminance white LED etc.



● Example of characteristic value

Filler to use		FN-005-P
Filler content	wt%	90
Thickness	mm	0.5
Thermal Conductivity	W/m · K	5

※Resin used: Silicone-based
 ※The values in the table do not guarantee performance.

AlN components for Semiconductor Manufacturing Equipment



Semiconductor manufacturing equipment (front-end process) is required to respond to the trend toward finer design rules and larger diameter wafers (ϕ 300 mm or larger).

To achieve that, the selection of materials for the components of the Semiconductor Manufacturing Equipment is extremely important. Aluminum nitride (AlN) is a well-balanced material with excellent thermal conductivity, thermal radiation (heat dissipation), thermal shock resistance, electrical insulation, and thermal expansion matching that of Si wafers.

● Feature

- Large thermal conductivity and thermal emissivity, high thermal uniformity
- Resistant to thermal shock, rapid cooling and rapid heating
- Low temperature expansion matched to Si prevents deformation of wafers due to temperature changes. It also reduces particle generation by deposition film.
- Excellent fluorine gas corrosion resistance

● Application

Semiconductor Manufacturing Equipment (CVD, Etching etc.)/Each Susceptor, Electrostatic chuck, Vacuum chuck Heater burning plate & Heater/Dummy Wafer/Target/Components for manufacturing equipment for compound semiconductors

● Specifications Shape (max.) □550(mm) Thickness dimension 0.25 to 0.30 (mm)

● Special Characteristic

※Representative value

Special Characteristic \ Grade		FAN-090	FAN-170	FAN-200
Thermal Conductivity	W/m·K(RT)	90	170	200
Thermal Emissivity	(100°C)	0.93		
Thermal Expansion Coefficient	10^{-6} /°C(RT~400°C)	4.5		
Thermal Shock Resistance	ΔT (Drop)	400 (Document value)		
Insulation Resistance	$\Omega \cdot \text{cm}$ (RT)	$>10^{13}$		
Dielectric Strength	kV/mm (RT)	15		
Dielectric Constant	(1MHz)	8.8		
Dielectric Loss	10^{-4} (1MHz)	5		
Bending Strength	MPa	250~300	300~400	
Density	g/cm ³	3.2	3.3	
Yttrium	%	0.0	3.4	
O (oxygen)	%	0.6	1.7	
Special Characteristic		High Purity	General Purpose	High Thermal Conductivity