

What's AlN?

Features

1. High thermal conductivity (about 10 times that of alumina)
2. Close thermal expansion coefficient to that of Silicon (Si)
3. High insulation
4. High mechanical strength (higher than alumina)
5. High corrosion resistance (non-wetted by most molten metals)
6. High purity (does not contaminate molten metal even at a high temperature)
7. Transparency (allows visible to infrared light to pass through easily)
8. High halogen-plasma resistance

Applications

Semiconductor manufacturing equipment

Plasma device parts
(Electrostatic) wafer chuck parts
Stepper wafer holding jig, etc.

Transportation

IGBT and GTO heat sink for
Automotive power supply substrate (for hybrid cars, etc.)
Electric train and locomotive power supply substrate

Communication

Laser diode heat sink for
Transmitters and amplifiers for optical fiber communication

Lighting and display

LED heat sink

Information processing

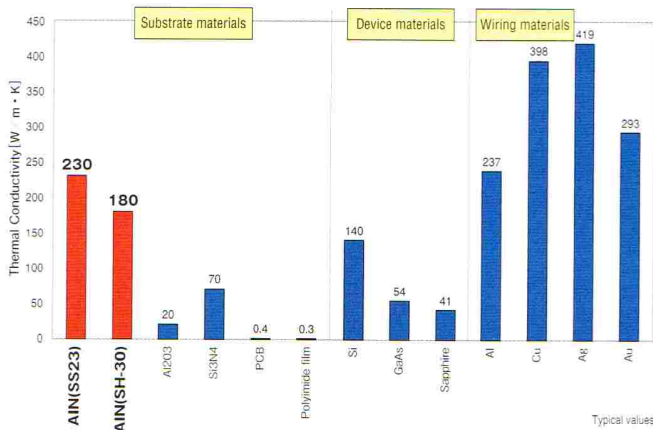
Heat dissipation sheet
Computer heat sink
Laser diode heat sink for
Optical disk pickup (CD-R, DVD, etc.)

Industrial machinery

IGBT heat sink for
Various types of inverter control power supply
High-performance elevator
High-performance mill

Differences among ceramic materials

Comparison of thermal conductivity

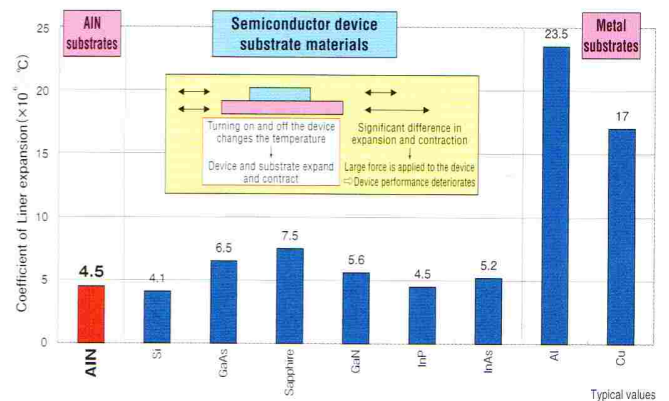


- AlN has high thermal conductivity outstandingly among various substrate materials.

Comparison of halogen-plasma resistance

SiC < Si₃N₄ < Al₂O₃ < AlN
Silicon carbide Silicon nitride Alumina Aluminum nitride

Comparison of thermal expansion coefficient



- AlN has a thermal expansion coefficient close to that of various semiconductor substrate materials. Metals with large thermal expansion coefficients are not suitable for the mounting of large semiconductor devices. AlN has an advantage on thermal expansion coefficient.

Feel free to ask us anything about AlN!



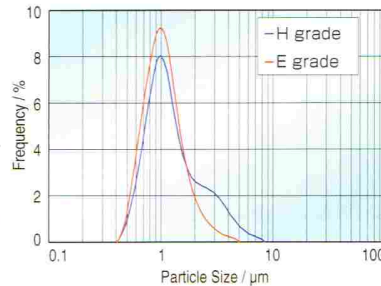
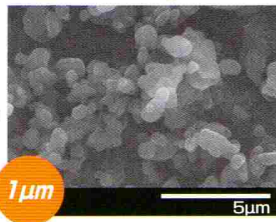
Aluminum Nitride (AlN) Filler

AlN powder can improve thermal conductivity of thermal interface materials!

AlN powder

1. Fine Powder

- Primary particle size; 0.6 μ m, very sharp size distribution
- Good dispersiveness for fine and sharp size distribution



Item	H grade	E grade
Specific surface area (m ² /g)	2.50~2.68	3.27~3.47
Mean particle size (μm)	1.07~1.17	0.96~1.07
Impurity	O (wt%)	0.78~0.86
	C (ppm)	130~270
	Ca (ppm)	200~240
	Si (ppm)	39~48
	Fe (ppm)	10~14

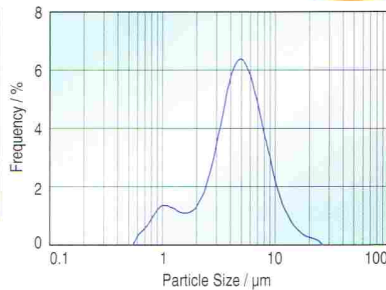
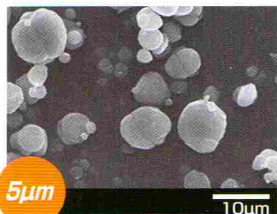
Values are typical; not for specification

2. Purity

- Low metal impurities
- Low oxygen contents

Spherical AlN powder

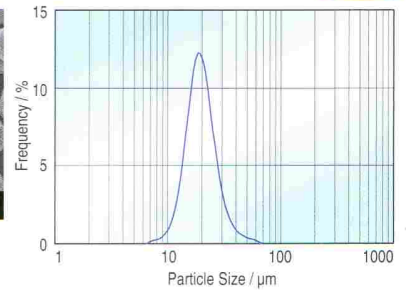
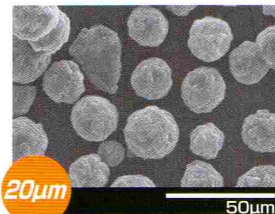
Under development



High filling content rate to resin is available due to its spherical shape and smooth surface.

Spherical AlN powder

Under development

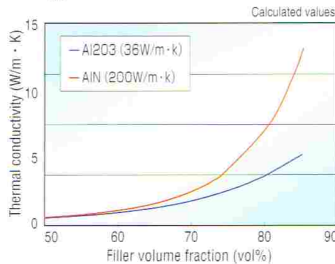


Volume fraction of filler in thermal interface materials is raised by mixing with some different particle size powders.

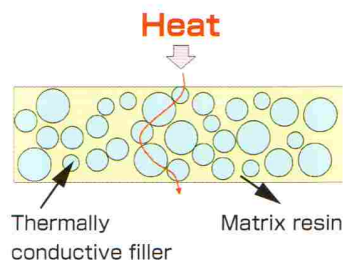
Effect of filler addition

Thermal conductivity of thermal interface materials

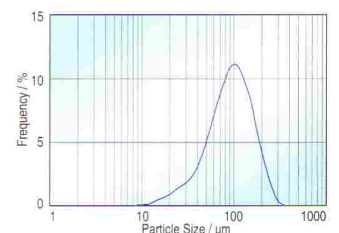
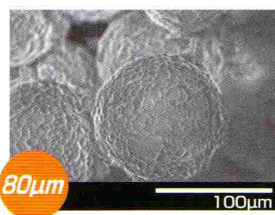
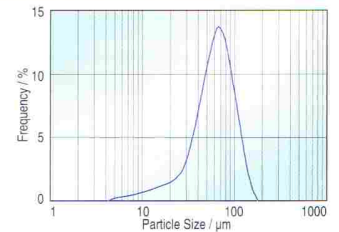
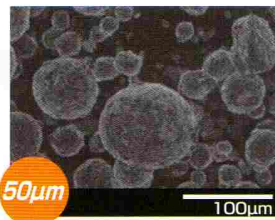
Thermal conductivity of thermal interface materials strongly depend on the type of filler and its volume fraction.



Structure of thermal interface materials



Sintered AlN powder



This sintered powder is obtained by sintering of AlN powder with some sintering aids.

Tokuyama Corporation

Shapal Sales Dept.

Specialty Products Business Div.

Shibuya Konno Bldg. 3-1, Shibuya 3-chome,
Shibuya-ku, Tokyo 150-8383, Japan
TEL +81-3-3597-5135 FAX +81-3-3597-5144
e-mail shapal@tokuyama.co.jp
URL <http://www.shapal.jp/eng/>

USA

Tokuyama America, Inc.
121S. Wilke Road, Suite 300
Arlington Heights, IL 60005, U.S.A.
TEL: +1-847-385-2195
FAX: +1-847-832-1705
e-mail: info@tokuyama-a.com
URL: <http://www.tokuyama-a.com/>

Taiwan

Taiwan Tokuyama Corporation
2nd Fl., 2, No59, Tian Xiang Rd.,
Taipei-City, 104, Taiwan R.O.C.
TEL: +886-2-2598-8250
FAX: +886-2-2598-8248
e-mail: sales@tokuyama.com.tw

Europe

Tokuyama Europe GmbH
Oststrasse 10, 40211 Düsseldorf Germany
TEL: +49-211-1754480
FAX: +49-211-357379
e-mail: nakatani@tokuyama.de

Shanghai

Tokuyama Trading (Shanghai) Co., Ltd.
2106, Shui On Plaza, 333 Huai Hai Zhong Road,
Shanghai, China 200021
TEL: +86-21-5306-4804
FAX: +86-21-5382-2894
e-mail: info@tokuyama.com.cn

Singapore

Tokuyama Asia Pacific Pte. Ltd.
61 Robinson Road, #14-02 Robinson Centre Singapore 068893
TEL: +65-6533-5258
FAX: +65-6533-5256
e-mail: takeuchi@tokuyama.com.sg
URL: <http://www.tokuyama-asia.com/>

Korea

Tokuyama Korea Co., Ltd.
#415 Korea Air City Terminal Bldg.
159-6 Samseong-Dong, Gangnam-Gu Seoul, 135-728, Korea
TEL: +82-2-517-3851
FAX: +82-2-517-3856
e-mail: k-tanaka@tokuyama.co.kr