Thermal conductivity comparable to metal! Thermalnite®

High Strength AlN Substrate

U-MAP Co., Ltd. Ultimate Material and Processing

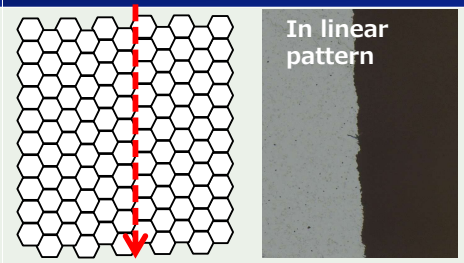
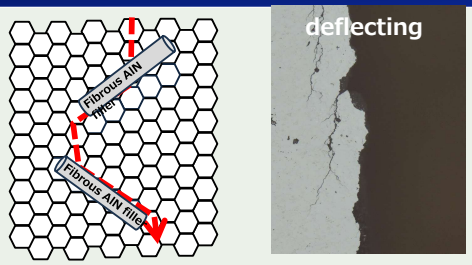
OKAMOTO GLASS Co.,Ltd.

◆AlN Substrate Lineup

				A	B	C	D	E
Property	Test Method	Conditions	Unit	170W	170W	200W	200W	230W
Thermal Conductivity	Laser Flash Method	—	W/m・k	170	170	200	200	225
Density	Archimedes Method	—	g/cm^3	3.3	3.3	3.3	3.3	3.3
Flatness	3D Measuring Machine	5×5 points	‰	<1.5	<1.5	<1.5	<1.5	<1.5
Coefficient of Thermal Expansion	TMA Method	40-300°C	×10^{-6}	3.92	X-D:3.81 Y-D:4.28	3.92	X-D:3.81 Y-D:4.28	X-D:3.81 Y-D:4.28
Bending Strength	Three point	—	MPa	360	X-D:520 Y-D:410	280	X-D:420 Y-D:330	X-D:363 Y-D:300
Fracture Toughness	SEPB Method	—	MPa√m	6	X-D:6.2 Y-D:4.4	6	X-D:6.2 Y-D:4.4	X-D:6.2 Y-D:4.4
Surface Roughness (Ra)	Laser Microscope	Blast after processing	μm	0.4	0.3	0.7	0.5	0.4
As-fired Thickness	Micrometer	—	mm	0.5 / 0.635 / 0.8 / 1.0 / 1.2				
Polished Thickness	Micrometer	—	mm	—	0.1: Under verification 0.05: Under verification	—	0.1: Under verification 0.05: Under verification	0.1: Under verification 0.05: Under verification
Outer Size	Calipers	—	inch	2 / 3 / 4.5				
Thermalnite Orientation				Cross	Unidirectional	Cross	Unidirectional	Unidirectional

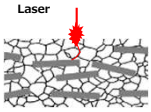
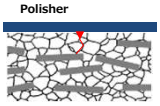
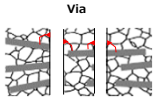
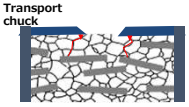
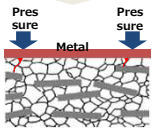
(Note) Values in the table are measured values, not guaranteed values.

◆Mechanical Strength Enhancement Method

	Competitive Product AlN Substrate	U-MAP Product High Strength AlN Substrate
Crack growth		

Fibrous AlN filler enhances deflection, increasing fracture energy and improving fracture toughness.

◆Suppresses microcrack progression during processing

	Laser Processing	Polishing/Grinding	Via Hole Processing	Metallization	Assembly
Challenge	・Cracks occur during laser scribe and break	・Surface cracks develop and spread during polishing	・During via hole processing, ・microcracks develop and spread	・Cracks spread, causing breakage during transport	・Reflow heating or pressing causes crack propagation
Thermalnite® Added AlN Substrate Effect					
	Reduces new crack formation	Suppresses cracks during polishing	Improves handling and yield	Improves handling and yield	Prevents cracking during assembly
Customer Benefits	Improved yield				
		Achieves lower thermal resistance through thinner sheets	Substrate miniaturization through reduced pitch Improved heat dissipation through large vias		

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