CoorsTek

Aluminum Nitride

Semiconductor Applications

High-Resistance Process-Grade Aluminum Nitride

Aluminum Nitride (AlN) is an ideal material for many semiconductor equipment and applications. With high resistance and low porosity, CoorsTek AlN outperforms other materials in process environments such as halogen gases and RF plasma.

Sample applications include:

- Plates
- Wafers
- Rings
- Gas distribution plates
- Nozzles
- Baffles
- Pedestal heaters
- Cover plates
- RF windows
- Crucibles

Key Attributes & Specifications:

- Pressure Assisted Densification (PAD)
- Utilizes hot pressing technology
- 550mm capable
- Very low porosity
- High thermal conductivity
- Chemical resistant
- Direct sintered to allow for net shape sintering of AlN

With over 500,000m² of manufacturing space across four continents, CoorsTek is the international partner of choice for high-performance semiconductor components. For more information, contact a CoorsTek materials expert today at +1 855 929 7100.

AIN MATERIAL PROPERTIES				ALUMINUM NITRIDE GRADES						
				PAD ALN HP	PAD ALN S-1	PAD ALN SC-1	PAD ALN HTC	DS ALN S-1	DS ALN S-2	DS ALN S-3
TYPICAL PROPERTIES*		UNITS	TEST	Pressure Assisted Densification, High Purity	Pressure Assisted Densfication, High Resistance	Pressure Assisted Densfication Semiconductor Grade	Pressure Assisted Densification, High Thermal Conductivity	Direct Sintered, High Resistance	Direct Sintered, High Thermal Conductivity	High Thermal Conductivity
Density		gm/cc	ASTM D 792	3.25	3.29	3.25	3.30	3.29	3.31	3.31
Crystal Size, average	average	µm	ASTM E-112	4 - 6	6 - 10	6	4 - 6	15	–	3 - 4
Color		–	–	GRAY	LT GRAY	DK GRAY	GRAY	CREAM	LT GRAY	CREAM
Flexural Strength (MOR)	20° C	MPa (psi x 10^3)	ASTM-C1161	365 (50)	352 (51)	310 (45)	375 (54)	260 (38)	300	310
Elastic Modulus	20° C	GPa (psi x 10^6)	various	276 (40)	320 (46)	330 (48)	330 (48)	320 (46)	310	320
Poisson's Ratio	20° C	–	various	0.22	0.21	0.22	0.22	0.21	–	0.21
Hardness		GPa (kg/mm²)	Knoop 300 gm	11.3 (1150)	11.8 (1200)	11.3 (1150)	–	–	–	10.9 (111)
Fracture Toughness	K(I c)	MPa $m^{½}$	Chevron Notch	3.25	2.75	3	–	–	3.35	3.6
Thermal Conductivity	20° C	W/m K	ASTM-C408	80.0	100.0	80.0	150-170	125.0	170-180	150-170
Coefficient of Thermal Expansion	25-1000° C	1 X 10^{-6}/ °C	ASTM-C372	5.5	5.4	5.5	5.5	5.4	5.2	5.3
Specific Heat	100° C	J/kg°K	various	705	–	726	705	–	738	700
Dielectric Constant	1 MHz	25° C	ASTM-D150	8.5	9.1	8.6	9.05	–	8.6	8.6
Dielectric Loss (tan Δ)	1 MHz	25° C	ASTM-D150	0.0005	0.0004	0.0002	0.0077	–	0.0005	0.0004
Volume Resistivity	25° C	ohm-cm	–	10^{13}	10^{14}	10^{12-13}	10^{14}	–	10^{13}	10^{14}
	200° C	ohm-cm	–	10^{9}	10^{12}	10^{11}	10^{14}	–	–	10^{10}
	400° C	ohm-cm	–	< 10^{8}	10^{9-10}	10^{8}	10^{9}	–	–	10^{9}

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