EXPRESS ELECTRONICS

MATERIAL DATASHEET

SILICON NITRIDE EE-SN1

DESCRIPTION

Silicon Nitride Si_3N_4 is solid ceramic material with black color. The most important feature is that it can keep high mechanical strength till 1200℃. At the same time, it also has excellent thermal shock resistance which suitable for applications with big temperature changes. With low wear friction and good self-lubrication, Silicon Nitride is applied for bearings or bearing balls.

PROS

- High mechanical strength
- High-temperature resistance
- Chemical inertness
- Biocompatibility
- Low thermal conductivity
- Electrical insulation
- Optical translucency
- Toughness

CONS

- Brittleness
- Processing difficulty
- Grinding and machining challenges
- Thermal shock sensitivity
- Cost
- Limited ductility
- Potential phase transformation
- Surface finish challenges

APPLICATIONS:

APPLICATION AREA	EXAMPLE OF USE
DENTAL IMPLANTS	Biocompatible material used for dental crowns and implants.
BEARINGS AND BUSHINGS	High wear resistance in industrial machinery applications.
CUTTING TOOLS	Used for high-speed machining due to its hardness.
INSULATORS	Electrical and thermal insulators in various industries.
OXYGEN SENSORS	Solid-state oxygen sensors in automotive and industrial use.
THERMAL BARRIER COATINGS	Coating for turbine blades and high-temperature components.
BIOMEDICAL COMPONENTS	Prosthetic joints and other medical implants.
FUEL CELLS	Electrolyte material in solid oxide fuel cells.
AEROSPACE COMPONENTS	High-temperature, wear-resistant parts for aerospace.
CERAMIC KNIVES	Sharp, durable knives with excellent edge retention.

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PHYSICAL PROPERTIES:

*Please note that all values quoted are based on test pieces and may vary according to component design. These values are not guaranteed in anyway whatsoever and should only be treated as indicative and for guidance only.

Property	Unit	Value
Melting Point	℃	~2715
Density	g/cm^3	5.5 – 6.1
Thermal Conductivity	20℃ $W/(m \cdot K)$	2 - 3
Coefficient of Thermal Expansion	$10^{-6}/℃$	9 - 11
Specific Heat Capacity	$J/(g \cdot ℃)$	0.4 – 0.6
Young's Modulus	GPa	200 - 250
Poisson's Ratio	-	0.25 - 0.31
Vickers Hardness	Kgf/mm^2	1200 - 1400
Maximum Use Temperature	℃	>1000
Electrical Resistivity	$\Omega \cdot cm$	$10^{12} - 10^{15}$
Transparency (Thin Layers)	-	Translucent/Transparent
Dielectric Constant	ε	8 - 30
Dielectric Strength	Kv/mm	5 - 15
Loss Tangent	ε	0.001 – 0.01