

Application Technology

Ceradyne has produced consistent, high-quality semiconductor processing components since 1996. Applications range from intricate ceramic parts as large as 700 mm in diameter to the smallest, injection molded devices.

Focus Rings



Material

- Silicon Nitride
- Silicon Carbide

Features

- Excellent Mechanical Properties
- Wear Resistance
- Corrosion Resistance

Gas Distribution Plates



Material

- Silicon Nitride

Features

- High Purity
- Excellent Mechanical Properties

RF Windows



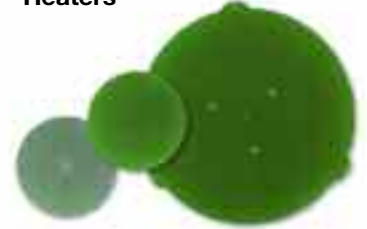
Material

- Aluminum Nitride
- Yttrium Oxide

Features

- Excellent Plasma Wear Resistance
- High Thermal Conductivity

Heaters



Material

- Aluminum Nitride

Features

- High Thermal Conductivity
- Uniform Temperature

Hot Edge Rings



Material

- Aluminum Nitride
- Silicon Carbide
- Silicon Nitride

Features

- High Purity
- Excellent Mechanical Properties

Vacuum Chucks



Material

- Aluminum Nitride
- Silicon Carbide

Features

- High Thermal Conductivity
- High Specific Stiffness

Dummy Wafers



Material

- Aluminum Nitride
- Silicon Carbide
- Silicon Nitride

Features

- Long Life Cycle
- Low Cost of Ownership
- Chemically Inert

Injection Molded Parts (CIM)



Material

- Aluminum Nitride
- Silicon Carbide
- Zirconium Oxide

Features

- Good Wear Resistance
- Excellent Mechanical Properties
- High Temperature Strength
- Flexible Shape

3-D Parts



Material

- Aluminum Nitride
- Silicon Nitride

Features

- High Thermal Conductivity
- High Purity
- Excellent Mechanical Properties

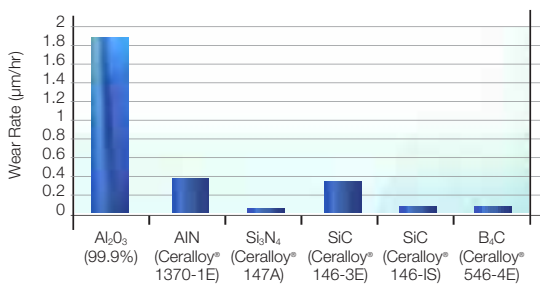
Application Technology

Performance of Ceralloy® Ceramics in an Etch Environment

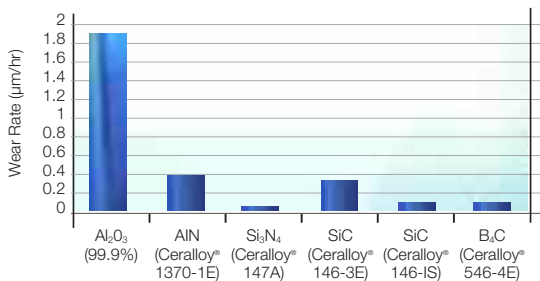
In etch environments, Ceradyne's Advanced Technical Ceramics (aluminum nitride, silicon nitride, silicon carbide, and boron carbide) exhibit significantly lower wear rates in comparison to more conventional materials such as quartz and aluminum oxide. Ceradyne's improved wear and corrosion resistant materials have:

- Longer Life
- Less Particle Generation
- Lower Cost of Ownership (CoO)

BCl₃ Plasma



Cl₂ + BCl₃ Plasma

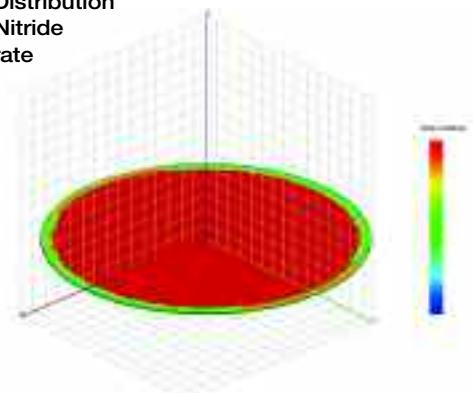


Ceralloy® Aluminum Nitride as Heater Substrates

Ceradyne Ceralloy® 137-CS Aluminum Nitride is the substrate material used by thick film heater OEMs. These heaters are used for wafer pre-heating, photolithography, wafer annealing, and other applications. The high Thermal Conductivity (180-200 W/mK) and high Specific Stiffness (96.9 Gpa cm³/g) of the Ceradyne material produces heaters with:

- Low Thickness Profile While Maintaining Flatness Over a Large Area
- Rapid Thermal Response
- Excellent Temperature Uniformity

Temperature Distribution of Aluminum Nitride Heater Substrate



Ceradyne's Ceralloy® 137-CS Aluminum Nitride is also used for vacuum chucks, microwave windows, wafer covers, dummy wafers, electrical substrates and other semi-conductor applications where corrosion and wear resistance and temperature uniformity are required. Ceralloy® 137-CS is compatible with the most ultra-pure and demanding semiconductor applications.



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Ceradyne Advanced Technical Ceramics

Ceradyne Inc. (NASDAQ: CRDN) is a publicly traded corporation specializing in the development and production of advanced technical ceramic materials. Ceradyne's Advanced Technical Ceramics are used in the most demanding applications for the automotive, industrial wear, semiconductor, orthodontic, nuclear, refractory, armor, and molten metal industries. Ceralloy®, EKasic®, TETRABOR®, and

MYCROSINT® components are produced in dedicated facilities around the world using patented material compositions and processing techniques. Common raw materials and conventional, time-tested ceramic manufacturing processes are coupled to produce high quality, cost effective semiconductor and electronic industry components.

