Ceramic Components for Semiconductor Processing
DESIGN & SIMULATION TECHNOLOGY

- SUPER COMPUTER
- Thermal conductivity analysis
- Stress analysis
- Fluid thermal analysis
- Shock analysis
- Electro magnetic field analysis
- Piezo electric device vibration analysis
- Electrical analysis

ANALYSIS TECHNOLOGY

- TEM
- XRD
- EPMA
- AFM

EVALUATION TECHNOLOGY

- Electrical evaluation
- Durability evaluation
- Mechanical evaluation
- Thermal friction evaluation
### Material Characteristics

<table>
<thead>
<tr>
<th>Item</th>
<th>Material</th>
<th>Unit</th>
<th>Measuring Method</th>
<th>Alumina (AO)</th>
<th>Sapphre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kyocera No.</td>
<td></td>
<td>A-479</td>
<td></td>
<td>A-479SS</td>
<td>A-6010</td>
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<tr>
<td></td>
<td></td>
<td>A-478M</td>
<td></td>
<td>A-479G</td>
<td>A-601L</td>
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<td>A-480S</td>
<td></td>
<td>A-6010</td>
<td>SA-100</td>
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<tr>
<td>Color</td>
<td></td>
<td>99% White</td>
<td></td>
<td>99% Ivory</td>
<td>99.9%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>99.5% Ivory</td>
<td></td>
<td>99.5% Ivory</td>
<td>99.9%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>99% Ivory</td>
<td></td>
<td>99% Ivory</td>
<td>99.9%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>99.9% Transparent</td>
<td></td>
<td>99.9% Transparent</td>
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</tr>
<tr>
<td>Bulk Density</td>
<td></td>
<td>g/cm³</td>
<td></td>
<td>3.8</td>
<td>3.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3.9</td>
<td>3.9</td>
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<td>Water Absorption</td>
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<td>%</td>
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<td>0</td>
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<tr>
<td>Vickers Hardness HVI (Load=9.807N)</td>
<td></td>
<td>(GPa)</td>
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<td>15.2</td>
<td>16.0</td>
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<tr>
<td>Flexural Strength (3PB) R.T.</td>
<td></td>
<td>MPa</td>
<td></td>
<td>310</td>
<td>360</td>
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<td>Young’s Modulus of Elasticity</td>
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<td>GPa</td>
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<td>360</td>
<td>370</td>
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<tr>
<td>Poisson’s Ratio</td>
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<td>0.23</td>
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<tr>
<td>Fracture Toughness (SEPB)</td>
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<td>MPam ³</td>
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<td>3 ~ 4</td>
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<tr>
<td>Coefficient of Linear Thermal Expansion</td>
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<td>40°C ~ 400°C</td>
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<td>7.2</td>
<td>7.2</td>
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<td></td>
<td></td>
<td>40°C ~ 800°C</td>
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<td>8.0</td>
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<tr>
<td>Thermal Conductivity 20°C</td>
<td></td>
<td>W/(m·K)</td>
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<td>15</td>
<td>15</td>
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<tr>
<td>Specific Heat</td>
<td></td>
<td>J/(g·K)</td>
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<td>0.78</td>
<td>0.78</td>
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<td>Heat Shock Resistance</td>
<td></td>
<td>°C</td>
<td></td>
<td>200</td>
<td>250</td>
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<tr>
<td>Dielectric Strength</td>
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<td>KV/mm</td>
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<td>15</td>
<td>15</td>
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<tr>
<td>Volume Resistivity</td>
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<td>O · cm</td>
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<td>10¹⁰</td>
<td>10¹⁰</td>
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<tr>
<td>Dielectric Constant (1MHz)</td>
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<td>JIS C2141</td>
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<td>Dielectric Loss Angle (1MHz)</td>
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<td>(X10⁷)</td>
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<td>Loss Factor</td>
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<td>10</td>
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<td>Nitric Acid(60%)90°C</td>
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<td>Wt Loss</td>
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<tr>
<td>Sulphuric Acid(95%)95°C</td>
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<td>mg/cm³</td>
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<td>0.25</td>
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<tr>
<td>Cautious Soda(30%)80°C</td>
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<td>0.26</td>
<td>0.05</td>
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</table>

### Unit Conversion Table

#### Stress

<table>
<thead>
<tr>
<th>Stress</th>
<th>Mpa</th>
<th>Kgf/mm²</th>
<th>Kgf/cm²</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>1</td>
<td>10⁵</td>
</tr>
<tr>
<td>9.807</td>
<td>1</td>
<td>1</td>
<td>10⁵</td>
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<tr>
<td>9.807 x 10⁴</td>
<td>1</td>
<td>10⁵</td>
<td>10⁶</td>
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</tbody>
</table>

#### Thermal Conductivity

<table>
<thead>
<tr>
<th>Thermal Conductivity</th>
<th>W/(m·K)</th>
<th>Calorie · Sec · °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>2.38 x 10⁻²</td>
</tr>
<tr>
<td>1.163</td>
<td>1</td>
<td>2.78 x 10⁻²</td>
</tr>
<tr>
<td>418.7</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

#### Notes

- These values are only for reference, showing the measurement results of test pieces specified.
- The values may change dependent on the using conditions and the shape of products.
- For more details, please feel free to contact us.
**Alumina Wafer Polishing Plate / Turn Table**
- **Material**: Al₂O₃
- **Size**: Up to 39" in diameter
- **Features**:
  - High rigidity
  - High chemical durability
  - Surface shape & roughness control

**Silicon Carbide Wafer Polishing Plate**
- **Material**: SiC
- **Size**: Up to 30" in diameter
- **Features**:
  - High thermal conductivity
  - Low thermal expansion
  - High rigidity

**Pad Dresser**
- **Material**: Al₂O₃, SiC, Si₃N₄
- **Features**:
  - High wear resistance
  - Square bumps / pyramid bumps

**Sapphire Carrier Plate**
- **Material**: Sapphire
- **Size**: Up to 8" in diameter
- **Features**:
  - High purity
  - High chemical durability
  - No grain boundary
  - Transparent
### Plasma Proof Dome
- **Material**: Al₂O₃
- **Size**: For 200mm / 300mm equipment
- **Features**:
  - High purity
  - High plasma durability

### Plasma Proof Ring
- **Material**: Al₂O₃, Y₂O₃
- **Size**: For 200mm / 300mm equipment
- **Features**:
  - High purity
  - High plasma durability

### Electro-Static Chuck
- **Material**: Al₂O₃, AlN, Sapphire
- **Size**: For 200mm / 300mm equipment
- **Features**:
  - High purity
  - High plasma durability
  - Good chucking / de-chucking response
  - High temp. and low temp. application

### Heater
- **Material**: AlN
- **Size**: For 200mm / 300mm equipment
- **Features**:
  - High purity
  - High plasma durability
  - Uniform thermal distribution
Vacuum Chuck
- Material: Al₂O₃, Porous Al₂O₃, SiC
- Size: For 200mm / 300mm equipment
- Features:
  - High purity
  - High chemical durability
  - Vacuum channel inside
  - Variety surface shape

Nozzle
- Material: Al₂O₃
- Size: Nozzle diameter +/-5 μm
- Features:
  - High plasma durability
  - Gas flow rate control

End Effector
- Material: Al₂O₃, SiC, Sapphire
- Size: For 200mm / 300mm equipment
- Features:
  - High purity
  - Vacuum channel inside
  - SiC coating
  - Mirror polished surface

Chamber Window & Tube
- Material: Sapphire
- Features:
  - High purity
  - High plasma durability
  - Transparent
  - High transmission factor
USM Stage - Assembly Technology
- Material: Al₂O₃, Al
  - Non Magnetic Metal, etc.
- Features:
  - Ultrasonic Motor drive
  - High positioning accuracy
  - Compact design

Metalized Products - Metal Assembly Technology
- Material: Al₂O₃, Al, Stainless steel, etc.
- Application:
  - IC Packages
  - High vacuum component
  - High voltage terminal, etc.

Coating Technology
- Material: SiC, DLC, etc.
- Features:
  - Discharge of static electricity
  - Soft contact

Large Size Product Manufacturing Technology
- Material: Al₂O₃, Y₂O₃, SiC, Si₃N₄
- Application:
  - LCD manufacturing equipment
  - Lithography equipment

Material Development Technology
- Material: Low thermal expansion materials
- Application:
  - Lithography equipment
  - Wafer Inspection equipment