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ALCHEMIST

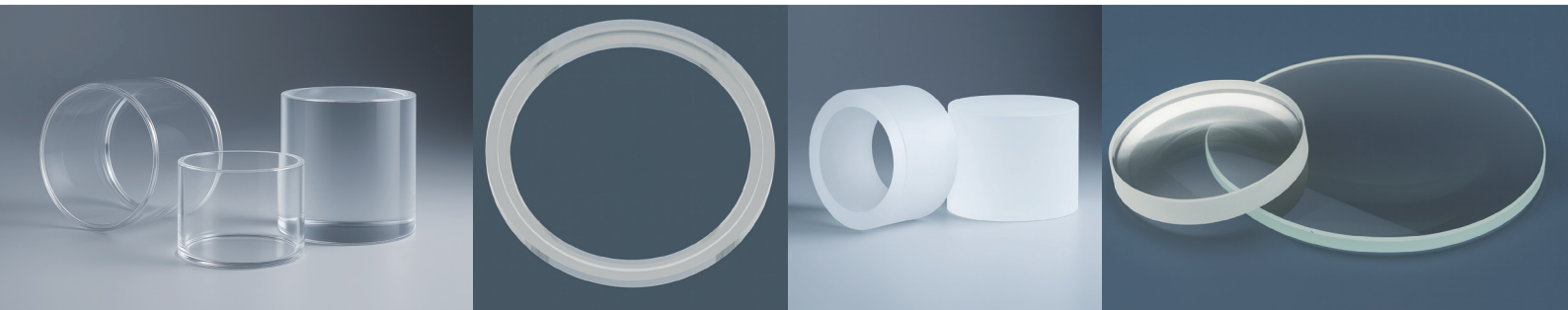
Make the Future of Advanced Materials with **ALCHEMIST**



An innovative global leader
in semiconductor materials
and components

ALCHEMIST

Synthetic Quartz for Semiconductor Application



We are innovators who love semiconductors, and we lead the future by producing the world's highest quality products

About **ALCHEMIST**

ALCHEMIST is a company that produces synthetic quartz materials and provides parts solutions.

General Status

Company	ALCHEMIST Co., Ltd.
President	KIM YONGKAK
Established	December 01, 2018
Capital	USD one million
Address	50, 3gongdan 3-ro, Seobuk-gu, Cheonan-si, Chungcheongnam-do, Korea
Homepage	www.ACMST.co.kr

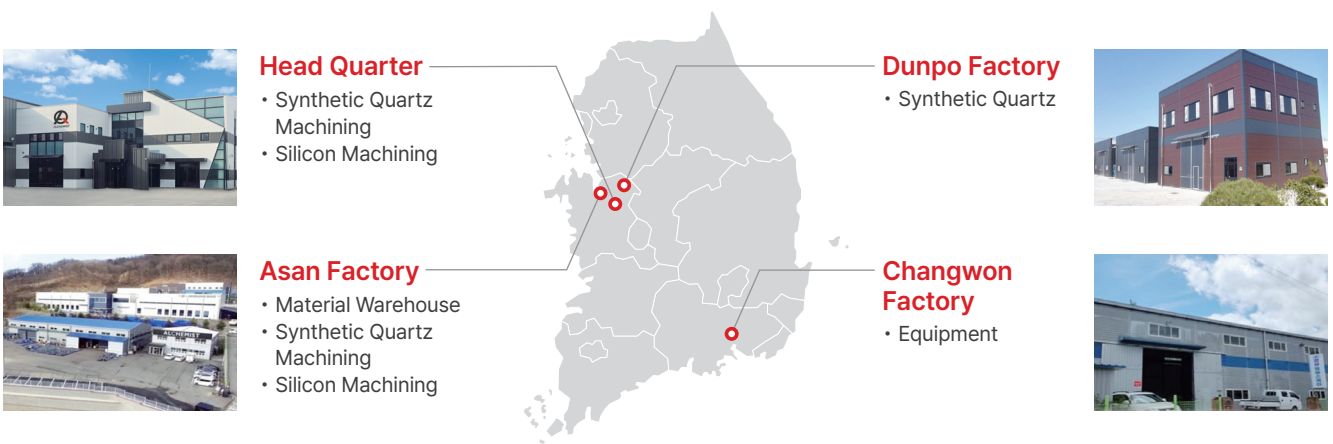
Main Products

Materials	Synthetic Q/Z (EQ), Si, CVD SiC, Al ₂ O ₃ , AlN, etc.
	Q/Z : Focus Ring, GDP, LINER, etc.
Parts	Si : Ring, Electrode, etc. SiC : Focus Ring, etc.
	Wafer : Cover Wafer, Test Wafer, etc.
Equipment	S/W, M/W, B/C, Rotary, CNC, Drilling, etc.

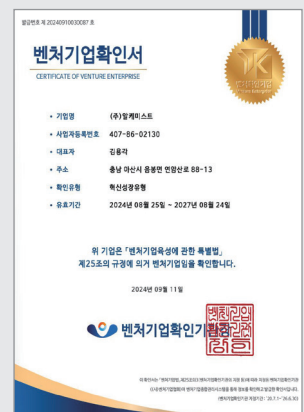
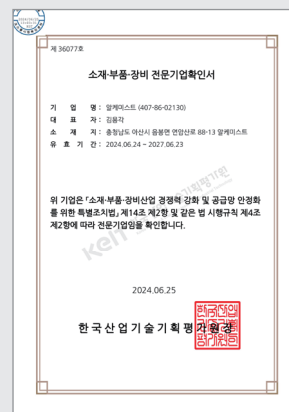
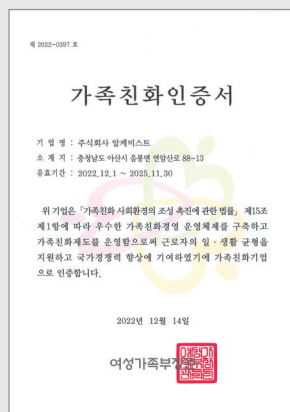
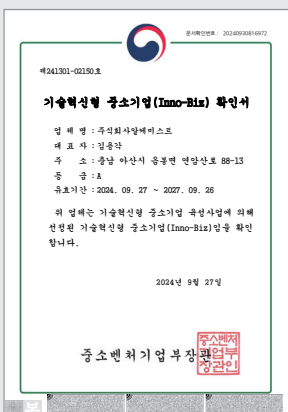
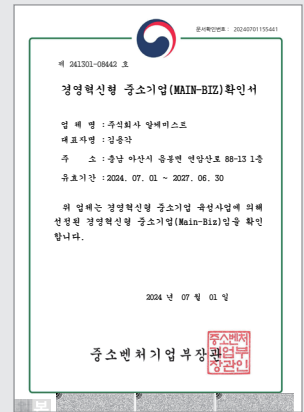
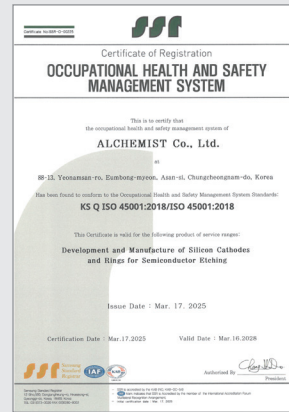
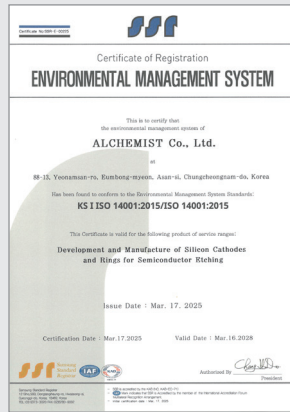
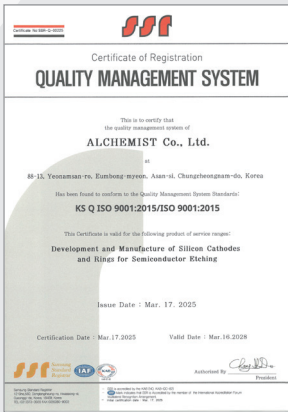
History



Location



Certification & Patent



ESG Quality Management



Environment 01

ALCHEMIST respects nature and, based on an environmental management strategy, pursues sustainable projects in cooperation with the local community. We are committed to creating a pleasant environment for our employees and the local community by promoting eco-friendly values.



Social 02

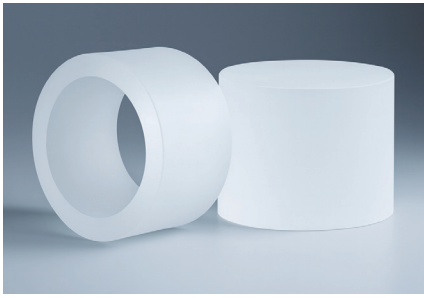
ALCHEMIST is committed to fulfilling its social responsibilities by addressing societal issues and creating shared value. Through active support for mutual growth, we aim to strengthen supply chain competitiveness and promote sustainable coexistence. Our journey to spread happiness not only to our partners but also to the wider community, including the local region, will continue into the future.



Governance 03

ALCHEMIST responds flexibly to stakeholder demands and technological changes to drive innovative management. By establishing sound values, we strive to build a fair and transparent corporate culture, fostering sustainable value growth.

Semiconductor Grade Synthetic Quartz



	OH	F	Cl	Pb	Sn
	ppm			ppb	
EQ #01	≤1	0.5	976	≤0.1	≤0.1
EQ #02	≤30	1	10		
EQ #03	≤200	3	5		

► All product lines of EQ have lower OH levels than others.

Application

Semiconductor grade quartz is widely used in dry etching and Plasma CVD process in semiconductor wafer manufacturing. (Ring and Disk)

Characteristics

Semiconductor grade quartz features high purity, low hydroxy and good high-Temperature resistance, etc.

Material Property Analysis

Item	Al	Be	Ca	Co	Cr	Cu	Fe	K	Li	Mg	Mn	Na	Ni	Ti	V	Zn
EQ#01	≤10	≤1	≤10	≤1	≤1	≤1	≤5	≤30	≤1	≤10	≤1	≤15	≤1	≤1	≤1	≤1
EQ#02	≤10	≤1	≤10	≤1	≤1	≤1	≤5	≤30	≤1	≤10	≤1	≤15	≤1	≤1	≤1	≤1
EQ#03	≤10	≤1	≤10	≤1	≤1	≤1	≤5	≤30	≤1	≤10	≤1	≤15	≤1	≤1	≤1	≤1

Physical Properties

Items	Values
Density (g/cm ³)	2.2
Coefficient of Thermal Expansion (x10 ⁻⁷ /K)	5.5
Softening Point (°C)	1670
Annealing Point (°C)	1210
Strain Point (°C)	1070
Thermal Conductivity (20 °C, W/m-K)	1.38

Product Size

Unit : mm

OD	ID	Thickness Range	Tolerance (OD, ID, T)	WT Tolerance
370	300	4 - 65	±0.5	±10.0%
420	330	4 - 65	±0.5	±10.0%
470	350	4 - 65	±0.5	±10.0%
520	400	4 - 65	±0.5	±10.0%

► Synthetic quartz material can be applied to both Ring Type and Disk Type

Synthetic Quartz Product Line



Item	Focus Ring	Single Ring	Top Ring	GDP	LINER	Photo Mask
Process	Etch			CVD		Photo
Image						

► Synthetic quartz Parts are available for use in semiconductor etching equipment, providing effective solutions.

Optic for Synthetic Quartz



Quality			OH (ppm)	Birefringence (nm/cm)		Transmittance (%)	
Spec.			<1	<10		85<	
NO.	Maker	Thickness (mm)	-	Area	XY-line	193nm	248nm
1	EVD - #01	10.0	0.3	3.0	2.0	87.0	91.0
2	EVD - #02	10.0	0.3	5.0	4.0	88.0	92.0

Application

Synthetic quartz is widely utilized in advanced optical systems due to its exceptional clarity and stability

Characteristics

Synthetic quartz has high purity, low hydroxyl level, and excellent transmittance.

Material Properties (Optic)

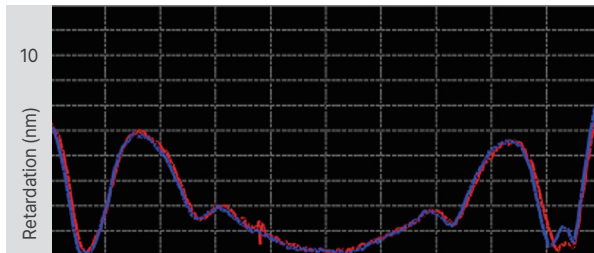
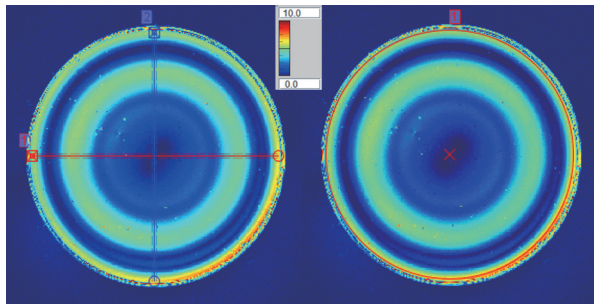
Parameters		Unit	Value
Chemical constitution	SiO ₂	w%	99.9999
Thermal properties	Coefficient Thermal Expansion	x10 ⁻⁷ /K (50 to 200)	5.5
	Softening Point	°C	1670
	Annealing Point	°C	1210
	Strain Point	°C	1070
	Thermal Conductivity (20 °C)	W/m-k	1.38
	Diffusivity (20 °C)	x10 ⁻⁷ m ² /s	9.5
	Specific Heat (20 °C)	J/kg-K	740
Optical properties	Refractive Index (193nm)	nD	1.5600
Mechanical properties	Density	g/cm ³	2.201
	Young's Modulus	GPa	73.9
	Knoop Microhardness	GPa (kg/mm ²)	5.6
	Mohs Hardness		6.8
	Rigidity Modulus	GPa	31.2
	Bending Strength	MPa	100
	Compressive Strength	GPa	1.1
	Tensile Strength	MPa	49
	Poisson Ratio		0.17
	Torsional Strength	N/mm ²	50
	Shear Strength	GPa	40
Electrical properties	Dielectric Loss Angle	at 500MHz	0.0057
	Dielectric Constant	at 500MHz	3.78
Bubble and Inclusions			Free

Quality Verification – OH , Birefringence , Transmittance

Quality			OH (ppm)	Birefringence (nm/cm)		Transmittance (%)	
Spec.			<1	<10		85<	
NO.	Maker	Thickness (mm)	-	Area	XY-line	193nm	248nm
1	EVD - #01	10.0	0.3	3.0	2.0	87.0	91.0
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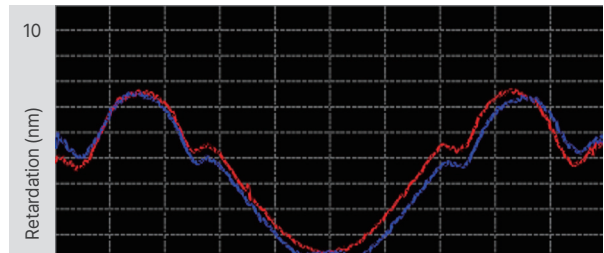
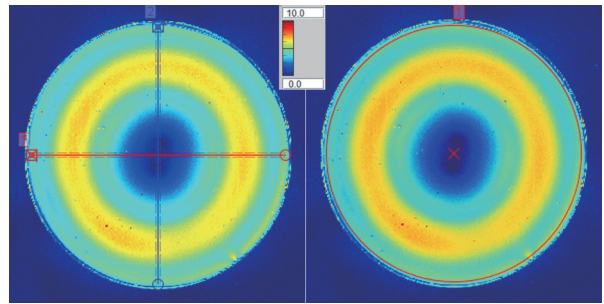
Birefringence

EVD - #01



Birefringence	nm/cm
Area	3.0
X-axis	2.0
Y-axis	2.0

EVD - #02



Birefringence	nm/cm
Area	5.0
X-axis	4.0
Y-axis	4.0

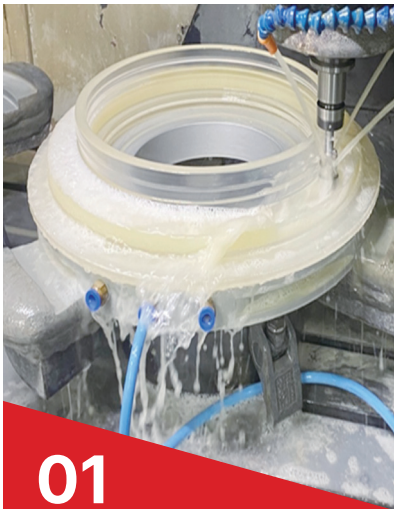
Synthetic Quartz Optical Product Line



Item	LENS	PRISM	Optical Container
	Optical Lens (Large & Small)	Optical measuring instrument	Measuring and medical devices
Image			

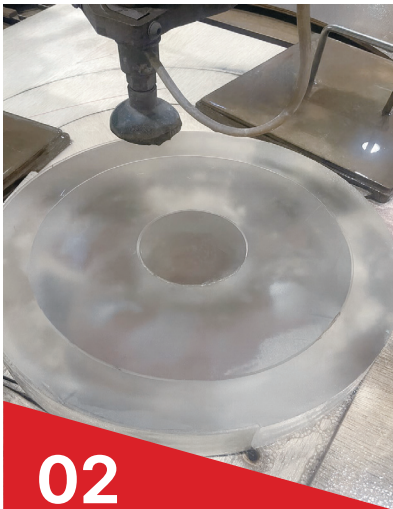
► Synthetic quartz Parts are available for optical lenses and optical containers, providing effective solutions.

Vision



01

- Achievement of breakthrough business performance.
- Enhancement of professional competencies.
- Performance-based management.



02

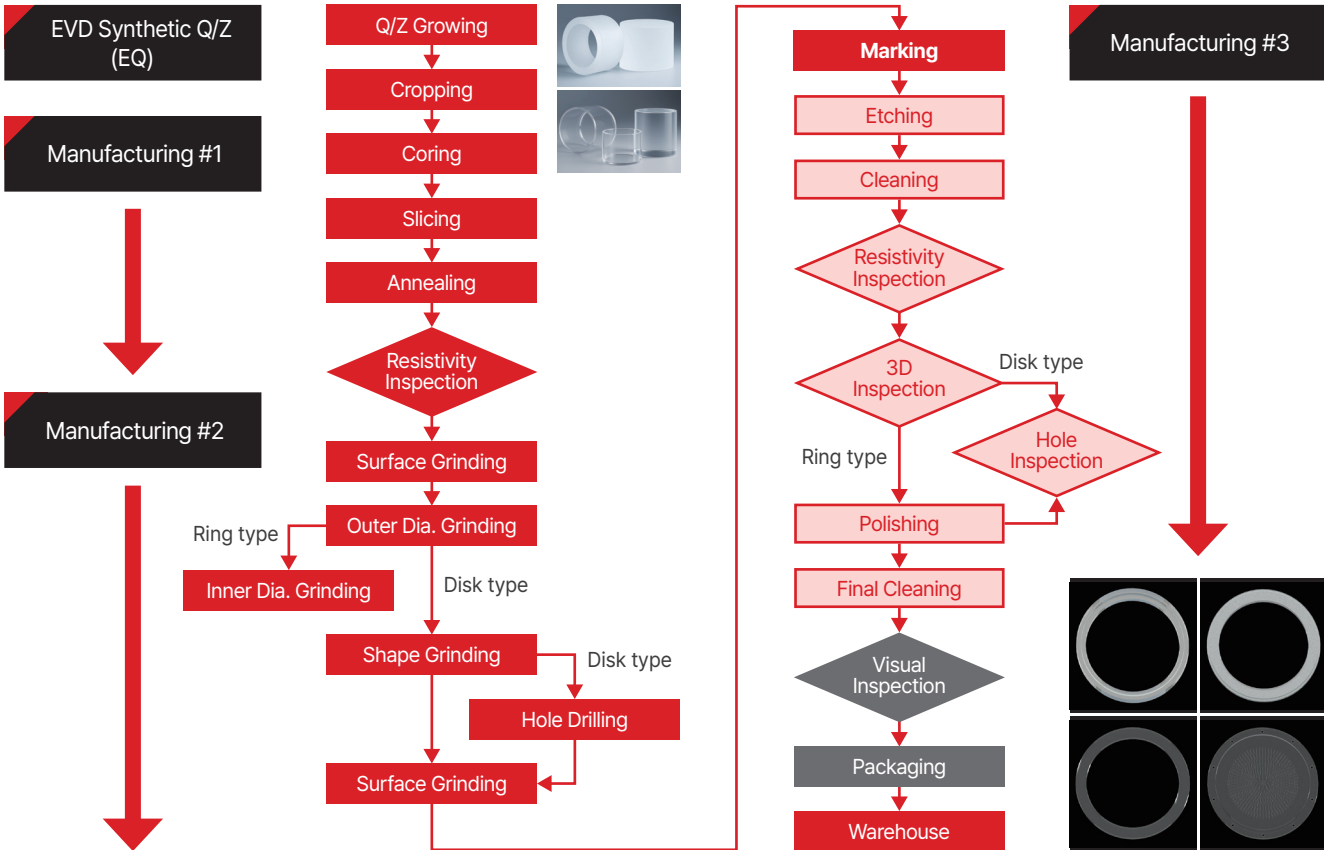
- Securing future growth engines.
- New Biz. magnification.
- Confirmation of excellent manpower.
- Expansion of production capacity.



03

- Establishment of an efficient management system.
- Establishment of management infrastructure.
- Establishment of listed company level processes.

Synthetic Quartz Machining Process





MISSION

We are innovators who love semiconductors, and we lead the future
by producing the world's highest quality products

Synthetic Quartz for Semiconductor Application



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CVD (Chemical Vapor Deposition) SiC Property



No.	Material Property	Units	Control spec
1	Bulk Purity	%	99.9999 (>6N)
2	Resistivity	$\Omega \cdot \text{cm}$	Middle : 1~25 Low : <0.02
3	Bulk Density	g/cm^3	≥ 3.15
4	Micro Vickers Hardness	GPa	≥ 26
5	Average Flexural Strength (Four-point bending test)	MPa	>232
6	Thermal Conductivity	W/m-K	>200

No.	Material Property	Units	Control spec
1	Bulk Purity	%	99.9999 (>6N)
2	Bulk Density	g/cm^3	≥ 3.20
3	Thermal Expansion coefficient	$10^{-6}/\text{K}$	4.5/p>
4	Thermal Conductivity	W/m-K	≥ 214
5	Coating Thickness	μm	20-250 \pm 10%

► Middle Res. and Low Res. Purity Result

Element	Detection Limit (ppm wt)	Spec.	Analysis Result	
			Middle Res.	Low Res.
Al	<0.05	≤ 0.15	<0.05	<0.05
Ca	<0.1	≤ 0.3	<0.1	<0.1
Cr	<0.1	≤ 0.3	<0.1	<0.1
Co	<0.01	≤ 0.15	<0.01	<0.01
Cu	<0.05	≤ 0.15	<0.05	<0.05
Fe	<0.05	≤ 0.15	<0.05	<0.05
Li	<0.01	≤ 0.15	<0.01	<0.01
Mg	<0.05	≤ 0.15	<0.05	<0.05
Mn	<0.05	≤ 0.15	<0.05	<0.05
Mo	<0.05	≤ 0.15	<0.05	<0.05
Ni	<0.05	≤ 0.15	<0.05	<0.05
K	<0.1	≤ 0.3	<0.1	<0.1
Na	<0.01	≤ 0.15	0.03	0.02
Ti	<0.01	≤ 0.15	<0.01	<0.01
V	<0.01	≤ 0.15	<0.01	<0.01
Zn	<0.1	≤ 0.3	<0.1	<0.1