

COreMAterial Technology





COMA Technology produces all of its products directly at its 10,000m² factory.

WIRELESS NETWORK DIVISION
BRIEF DESCRIPTION GOES HERE

B2B NETWORK BUSINESS DIVISION
BRIEF DESCRIPTION GOES HERE

MOBILE SECURITY SERVICE
BRIEF DESCRIPTION GOES HERE

SOCIAL NETWORK BUSINESS DIVISION
BRIEF DESCRIPTION GOES HERE

CONTENTS

General Info	02
Change to Sapphire	06
Nozzle/Injector	10
Silicon Parts	12
Porous Parts	14
Quartz Parts	16
Plunger Parts	17
Ceramic Parts	18

A Company to create a new structure in the
Global Market of Semiconductor Industry.
Opening the Future of Semiconductor Industry with COMA Technology.



We have a whole process line for production,
Especially for the Post-treatment Process Like
Lapping, Polishing, Etching, Cleaning and
Packing In the 10~1,000 Class Clean Room.

Hello, this is from Sung-hoon Park, President/CEO of COMA Technology Co., Ltd. a specialized company in semiconductor equipment materials and parts.

Global Specialized Material/Part Company

COMA Technology Co., Ltd., since its inception in January 2013 starting with manufacture and lapping/polishing of parts of sapphire and ceramic, has grown up to be a specialized company in parts and materials of various high functional sapphire and ceramic for semiconductor, display, defense and medical industry machines, etc.

Especially in manufacture of industrial sapphire parts COMA has the top level of machining, lapping, polishing and surface finish technology in Korea and through incessant R&D investment it continues to newly bring out such matchless unique technologies as bonding, micro machining, etc.

COMA Technology Co., Ltd., without resting on our present achievements, will be prepared for the new era through development of new materials and parts, development of new products for cost reduction and yield enhancement, diversification of exports, and innovative creation of markets which haven't existed so far, etc. and fulfill social responsibility to become an everlasting company, contributing to making the world of abundance, the world good to live in and the world where all can live well together. Your deep interest and encouragement will be highly appreciated.

Thank you!

Sung-hoon Park, President/CEO, COMA Technology Co., Ltd.

2013~2014

2015~2016

2017

2014

- July** Obtained ISO9001(International Quality Management) Cetification
- April** Established Certified Company Affiliated Underresearch Institute
- January** Moved First Building to Gwangju , Gyeonggi-do

2013

- November** Certified Technology Venture Fund
- September** Developed Aluminium Reflector for K-1 Armoured Vehicle
- July** Developed Porous Ceramic Vacuum Chuck
- May** Sapphire Surface Processing Technology Development
- February** Established Coma Technology Corporation

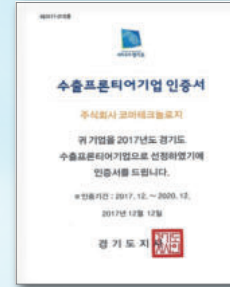
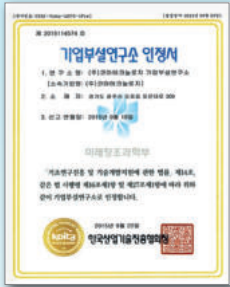
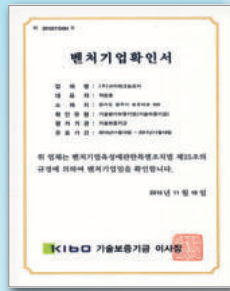
2016

- December** Participated in Semicon Japan(Tokyo) Exhibition
- July** Certified as Innobiz Company
- May** Attracted Investment from Technology Gurantee Fund
- January** HDP CVD Equipment , Development and Mass Production of Sapphire Side Nozzle

2015

- December** Development Of Etching Process for Sapphire and Double Joint Nozzle
- December** Development of CVD Sic Ring Processing / Surface Technology Development
- November** Recertified as Venture Company
- May** Development and Mass Production of Sapphire Plasma for HDP- CVD Equipment Injector

- December** Received Gyeonggi Governor Award (Excellent Venture)
- December** Export Frontier Co
- November** Extension and Relocation of Gumi New Building
- June** Patent Registratio Manufacturing Me
- May** Selected as Successor Business
- April** Certified as Parts Manufacturer March Semicon K
- March** Participated in Semiconductor Exhibition



2018

2019~CURRENT

gi Provincial
e Company)
Company Certification
ocation of
g (Area 10,000m²)
on (Sapphire Edge Ring
ethod)
Successful Export Package
Material Company
orea Exhibition
micon Korea(Coex)

- December** Won Gumi Mayor's Award for Clean Management Act
- October** Designated as a Talent Development Small Business
- September** Selected as Promising Export Firm
- September** Participated in Semicon Taiwan Exhibition
- July** Participated in Semicon West(USA) Exhibition
- June** Selected as a Partner of Hynix/Shared Growth Program
- March** Participated in Semicon China(Shanghai) Exhibition
- February** Participated in Semicon Korea(Coex) Exhibition
- January** Investment in Si Ring , Electrode Line

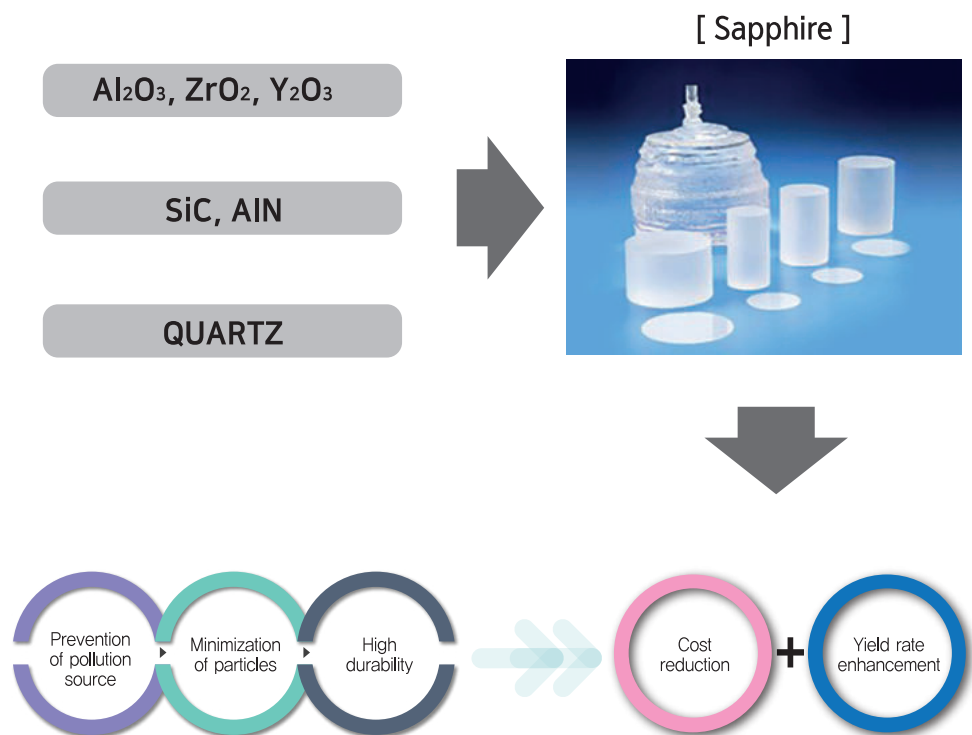
- September** Participated in Semicon Taiwan Exhibition
- August** ISO9001&14001 Quality Environmental Management Certification
- July** Selected as Mid Sized Start Up Leap Package Business
- June** MOU with GTAT to Enter US Semi Market
- May** Selected as Cloud Based Smart Factory R&D Project
- March** Participated in Semicon China(Shanghai) Exhibition
- January** Participated in Semicon Korea(Coex) Exhibition
- January** Development of Large Diameter Sapphire Window 22"/23"
- January** Attracted 2nd Investment from Domestic Asset Management Company

Change to Sapphire

The Strongest Material on Earth after Diamonds

Sapphire is an ultra-high purity single crystal material, the second hardest material on earth after diamond, and the best existing material with heat resistance and chemical resistance at high temperature of 2040°C.

▶ Market Flow of Process Parts



If sapphire is replaced with components made of Ceramics, Quartz, Silicon, etc., which are used in the semiconductor process, the yield is maximized by minimizing the generation of pollutants and particles in the deposition and etching process chambers during the semiconductor manufacturing process.

In addition, due to the high durability of the sapphire material, the component lifespan is increased and the replacement cycle is increased, making an innovative contribution to cost reduction.

Change to Sapphire

► Sapphire Properties

HARDNESS	The Hardest Material on Earth after Diamond (Lift Pin)
HEAT RESISTANCE	Withstand 2040°C with No Change in Properties
CORROSION RESISTANCE	Chamber Etching in Extreme NF3 and CF4 Gas Environment. (Gas Injector , Nozzle , Chamber Window)
CHEMICAL RESISTANCE	Radical Reaction does not Occur in Semiconductor Etch Process. Stable Molecular Structure Minimises Contamination Inside the Chamber (Tube, Applicator)
INSULATOR	Very Stable Insulator that is Generated by Plasma in Process of the Chamber Minimising Arcing to Reduce Process Defects

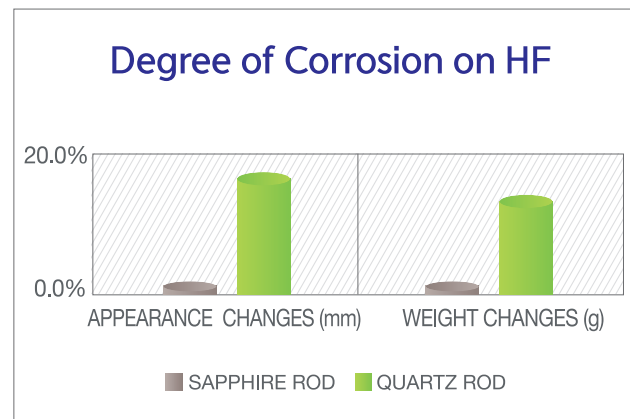
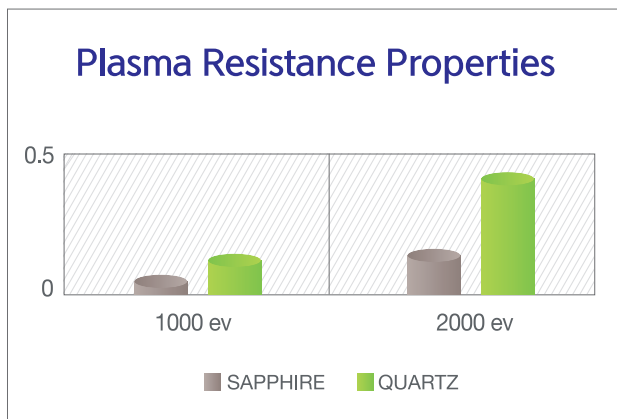
► Sapphire Properties

Physical Properties	Value
Crystal structure	Hexagonal system (rhombohedral)
Unit cell dimension	a = 4,758 Å , c = 12,991 Å
Density	3,98g/cm ³
Hardness	9 mohs, 1,525–2,000 knoop
Tensile strength	400Mpa
Flexural strength	2,500~4,000Mpa

Thermal Properties	Value
Thermal conductivity (at 300K)	23.1 W/m·k (perpendicular to c-axis) / 25.2 W/m·k (parallel to c-axis)
Specific heat	105 J/kg·K at 91K / 761 J/kg·K at 291K
Thermal coefficient of linear expansion (at 323K)	6.66 × 10 ⁻⁶ /K (parallel to optical axis) 5.00 × 10 ⁻⁶ / K (perpendicular to optical axis)
Melting point	2,050 °C
Boiling point	2,980 °C

► Why 'Sapphire'?

Sapphire is chemically durable, high strength, Material with high penetrability and is used in semiconductor process chambers as well as many other high vacuum applications. Recently, Quartz is rapidly replaced by Sapphire in demanding high vacuum fields. With many years of manufacturing experience in this field, Coma Technology aims to be the world's No. 1 in the Sapphire manufacturing market.

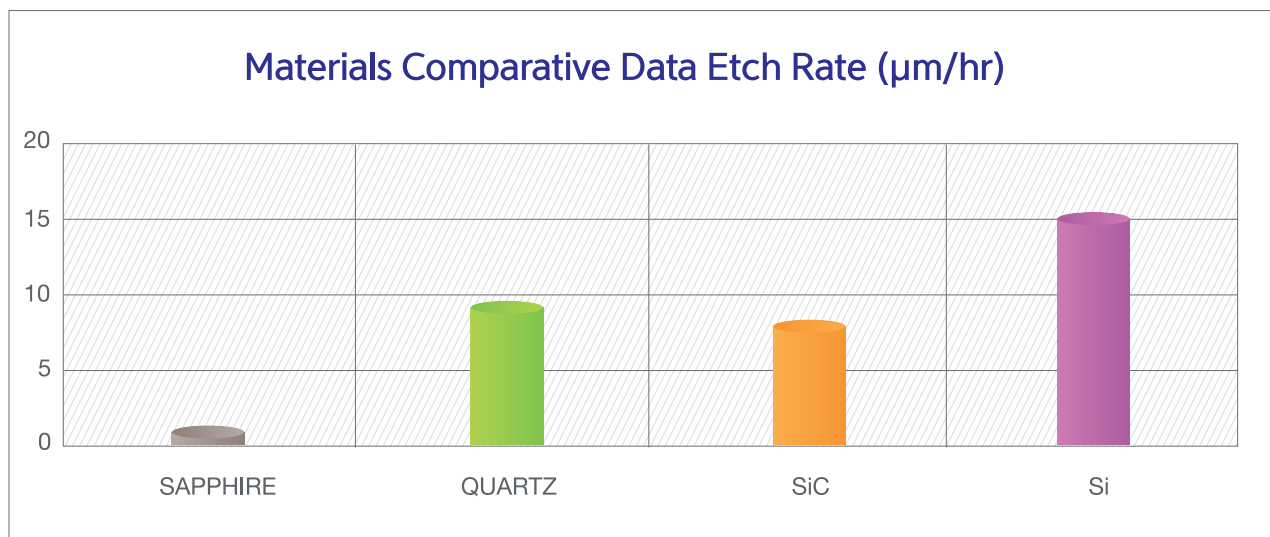


Ar+ Ion Energy	1000 ev	2000 ev
Sapphire	0.04	0.11
Quartz	0.13	0.4

	Sapphire Rod	Quartz Rod
Appearance Changes (mm)	0.5%	16.2%
Weight Changes (G)	0.5%	13.3%

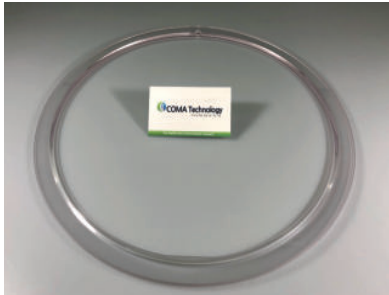
Ion Milling Rate: : Sapphire erodes at a rate of less than 1/3rd of Quartz

Measure the amount of variation after immersing for 12 hrs in 49% hydrofluoric acid concentration

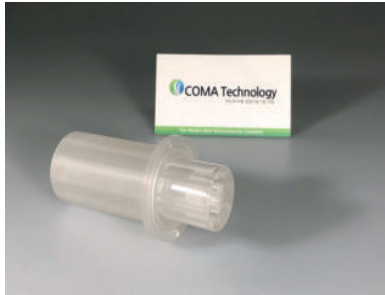


Change to Sapphire

► Change to Sapphire



HOT EDGE RING FLEX 45
Si → **Sapphire**

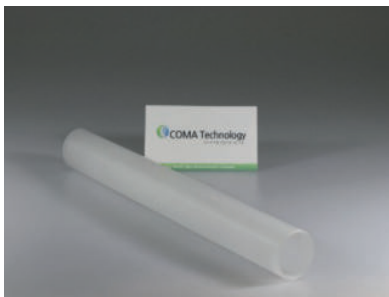


INJ, DUAL, FACSEAL, IEP, HNYCMB
 Al_2O_3, Y_2O_3 → **Sapphire**



NOZZLE, AIN, 1.76L X .14DIA -N
 Al_2O_3, AlN → **Sapphire**

► Sapphire Tube



► Sapphire Window



A Company to Create a New Structure
in the Global Market of Semiconductor Industry!

Nozzle/Injector(Ceramic → Sapphire)

Coma Technology Co., Ltd. directly produces nozzles used in CVD & Etching process chambers during the semiconductor manufacturing process. In addition to the production of existing Al₂O₃, AlN, and Quartz materials, changing to Sapphire material minimizes the generation of pollutants and particles generated in the chamber to maximize the yield. In addition, due to the high durability of the sapphire material, the component lifespan is increased and the replacement cycle is increased, making an innovative contribution to cost reduction. Minimize particle generation in environments using NF₃ and CF₄, creating a long life and continuous working environment.

Gas flow(Less than 1%)



Ultima-x side nozzle, ALN, 1.76L x .020DIA, 100% flow

Applied Materials (AMAT) Centura AP
Ultima×300mm HDP-CVD
Al₂O₃, AlN → **Sapphire**

Sapphire + Sapphire



HPQ Injector NOZ, 8x, .055-45DE

LAM Research 2300 Versys Kiyoo
Quartz, Al₂O₃ → **Sapphire**

Drastically longer lifespan



INJECTOR TUBE STAR INSERT 1.375

NOVELLUS SPEED HDP-CVD
Al₂O₃ → **Sapphire**

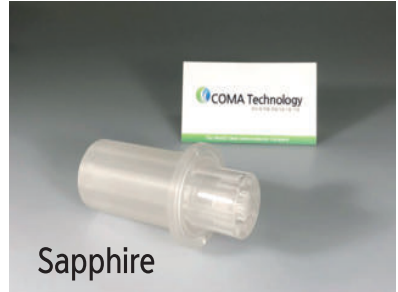
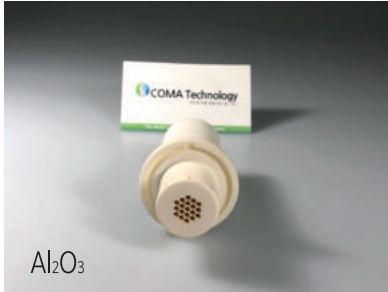
Quartz + Sapphire



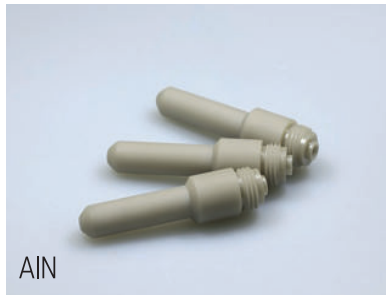
ENDPOINT, QTZ, W/SAPPHIRE WINDOW (Top hat, HPQ)

Applied Materials (AMAT) Centura AP
Ultima×300mm HDP-CVD
Al₂O₃, AlN → **Sapphire**

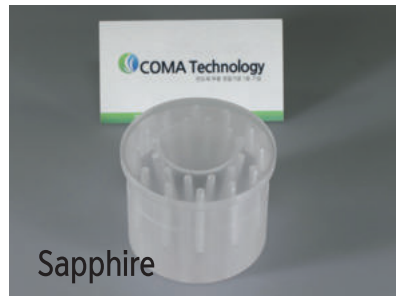
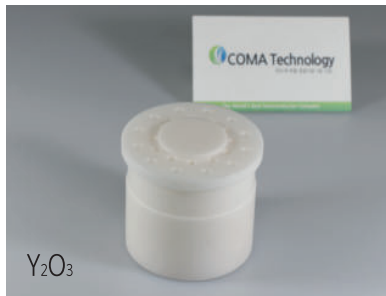
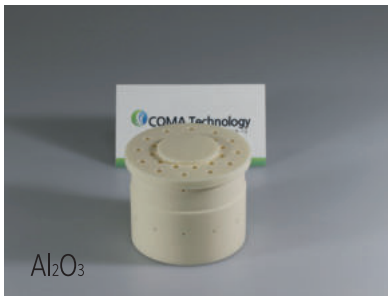
Change to Sapphire



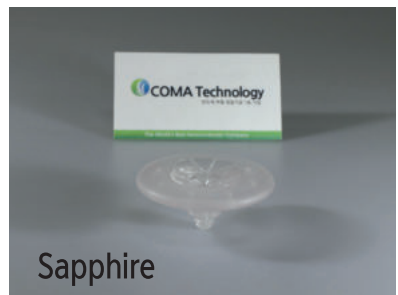
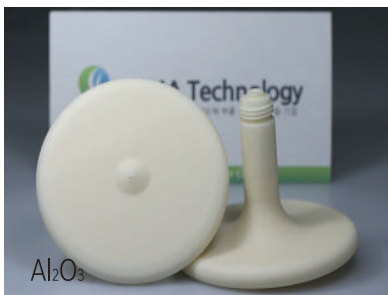
LAM / INJ, DUAL, FACSEAL, IEP, HNYCMB



AMAT / Side Nozzle(All Dimensions Possible)



AMAT / NOZZLE INSERT DG 1.0 ID X 2.0L 300MM DPS



AMAT / Top Nozzle HDP
CVD Ultima NOZZLE
4HOLE 60DEG, BAFFLE

AMAT / 300mm HDP AlN 8 holes top nozzle Baffle

A Company to Create a New Structure
in the Global Market of Semiconductor Industry!

Silicon

Silicon, widely used as semiconductor element material, is an excellent material that can be stably supplied to semiconductor industry as it is abundantly found in sand, rocks and ores in the oxidized form of SiO_2 , Silicon has high purity single crystal structure of 99.9999% after purification process, and has strong durability, high functionality and high reliability by operating element in relatively high temperate (of up to approximately 200°C) due to low change in physical and mechanical properties according to temperature change.

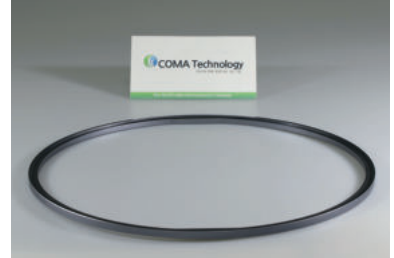
► 8" Silicon



TEL / Focus Inner Ring



TEL / Focus Ring



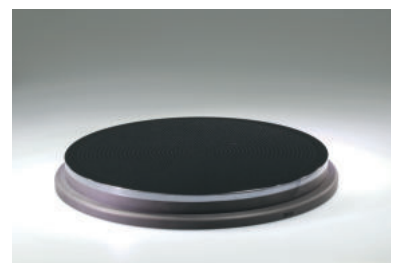
AMAT / Insert Ring



AMAT / Insert Ring

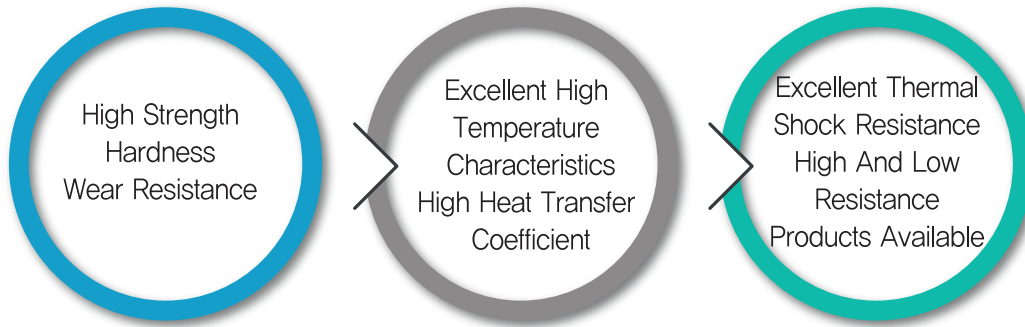


TEL / 6" Electrode



LAM / Electrode Silicon
+ Graphite Cathode

Silicon



Coma Technology Co., Ltd. has a full process production line for the production of Si-Ring and Si Electrode with 10- 1000 Class Clean Room Facility.

► 12" Silicon



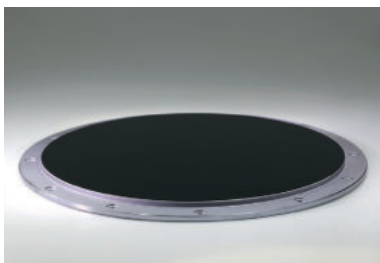
LAM / Hot Edge Ring



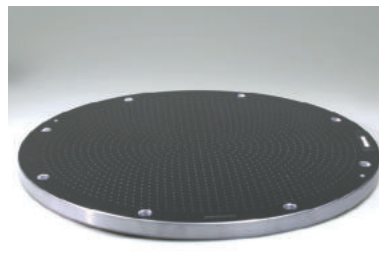
TEL / Focus Ring



AMAT / Collar Producer Etch Ring



TEL / Thin Inner Cell(738)



TEL / Electrode Cell(912)

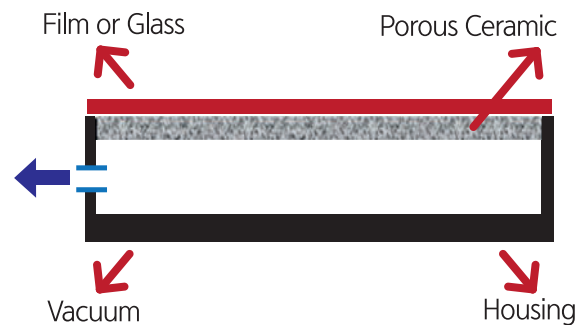
A Company to Create a New Structure
in the Global Market of Semiconductor Industry!

Porous Vacuum Chuck

POROUS CERAMIC is a sintered body made of numerous pores by applying ceramic sintering technology, unlike conventional adsorption plates. Recently, it is widely used as a base material for various industries such as various filters, high temperature refractory materials, absorbent materials, sound absorbing materials, lightweight structural materials, and heat insulating materials. In particular, high performance vacuum chuck adsorption technology is used in the process of thin film adsorption required in the semiconductor, led and display production field. Coma Technology Co., Ltd. identifies the needs of Customers, and designs and produces the most suitable products for meeting their requirements.

► Why 'Porous Vacuum Chuck'?

- High Performance , High Precision & Uniform Adsorption
- Excellent Chemical Resistance against Acid and Alkali, High Heat Resistance
- No Hole Marks on Air Holes Due to Adsorption/floating
- Specific Gravity Lower than Aluminium
- Applicable in Various Fields According to Customer Needs



► Why 'COMA Technology's Porous'?

- One Stop Process from Material Production > Design > Product Manufacturing
- Porosity /Pore Size Adjustable According to Customer Request
- Partial Adsorption Possible by Micro -Pore and Own Flow Path Design
- Proven Superior Durability Material
- Ensuring a flatness of 5um or less (Specifications can be discussed)

► Porous Vacuum Chuck Application Field

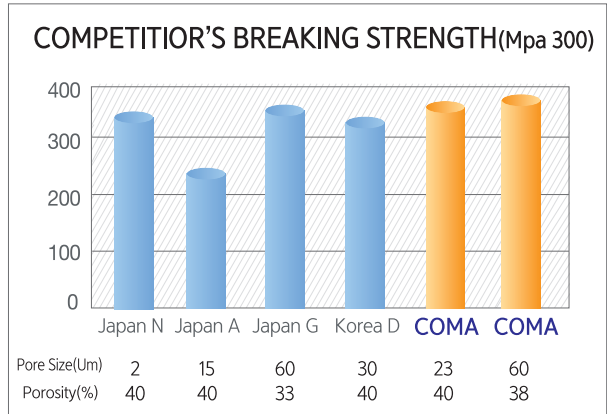
SEMICONDUCTOR	Grinding, Mount, Peeling Chuck, Dicing
DISPLAY	Glass & Film Adsorption Dicing
PCB	Multi Porous PCB Adsorption & Inspection
LED	Wafer Adsorption, Inspection
MACHINING	Back Grinding, Grinding /Polishing Machine For Adsorbing CNC Equipment Products

CM-01	CM-02	CM-03	CM-04
2um 40%	15um 40%	23um 40%	60um 38%

Porous Vacuum Chuck

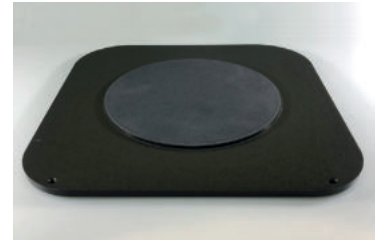
▶ Coma Technology's Porous Product Specification

PORE SIZE	2~120um
POROSITY	25~40%
COLOR	Black , Brown and White
ANTI STATIC	$10^6 \sim 10^9 \Omega$
STANDARD	Maximum 22" (500*500)

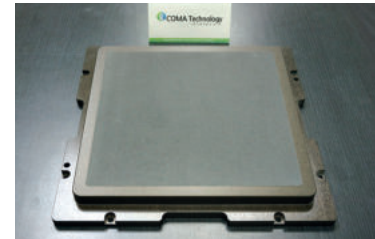
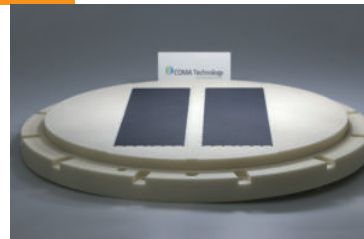
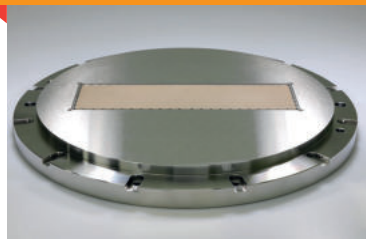


▶ Coma Technology's Products

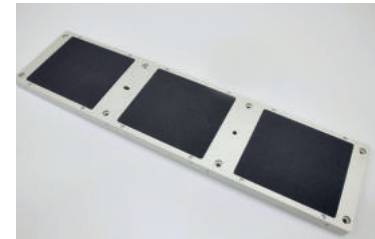
Wafer Adsorption(4" ~12")



Glass/Film Adsorption



Multi-Use/Divided Adsorption

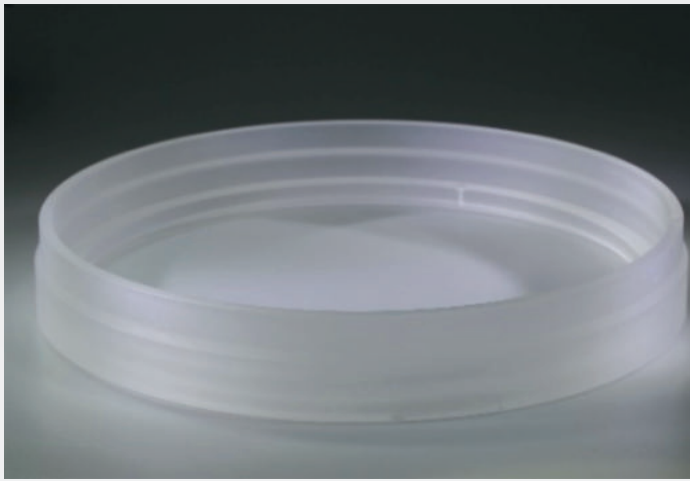


A Company to Create a New Structure
in the Global Market of Semiconductor Industry!

Quartz

Fused silica glass, commonly called quartz glass, is amorphous and has excellent properties. It has a very low thermal expansion rate, excellent thermal shock resistance, and excellent battery insulation, which is widely used in the semiconductor, aerospace, and energy fields.

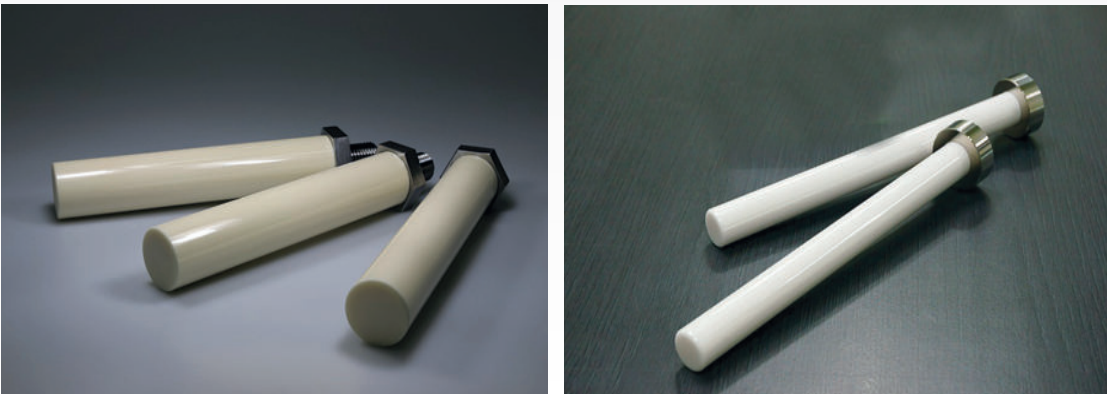
Coma Technology Co., Ltd. can manufacture various quartz products including quartz cover ring and semiconductor main parts consumables.



Groups of Various semiconductor Parts

Ceramic Plunger

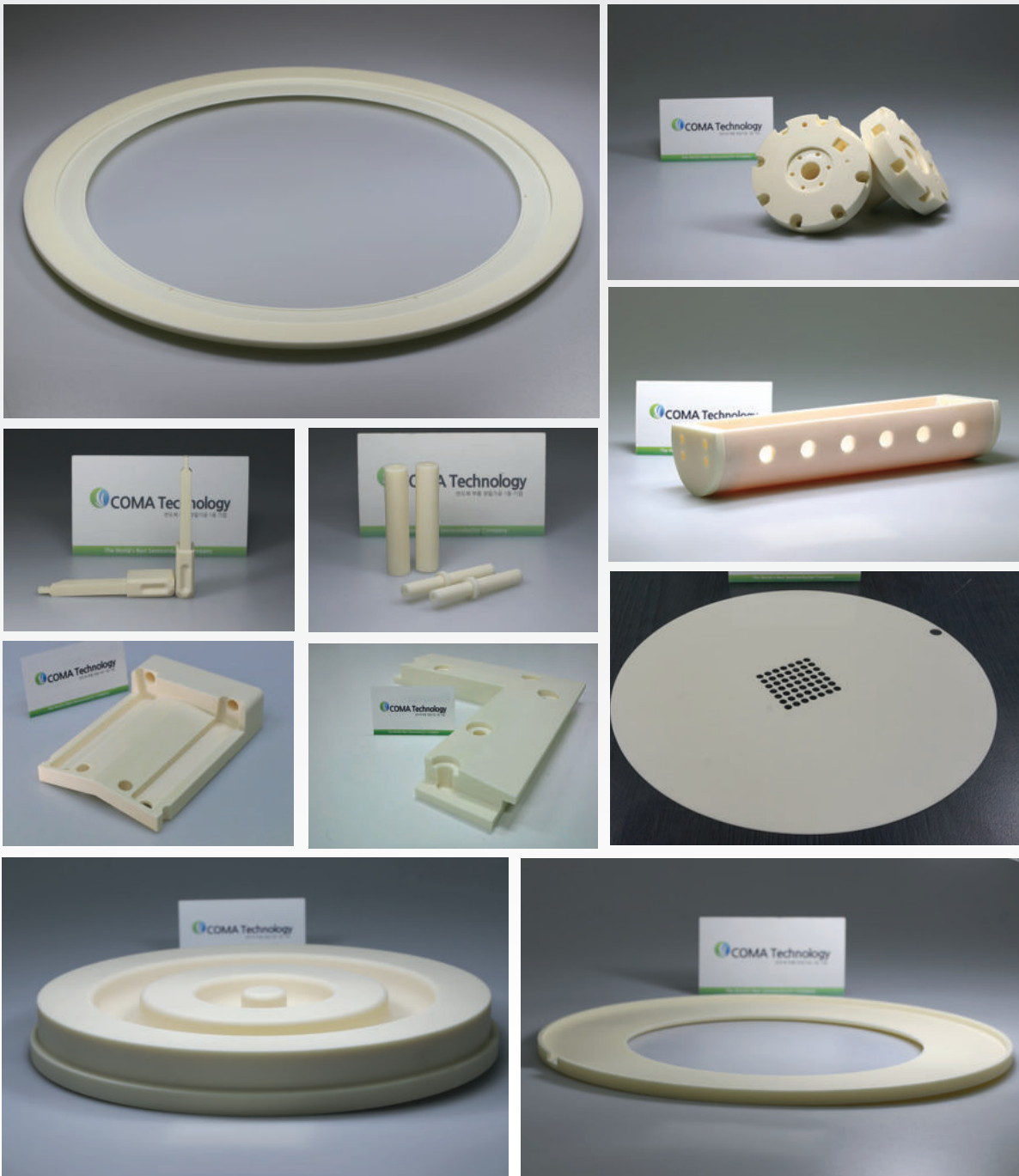
The ceramic plunger manufactured by Coma Technology Co., Ltd. is manufactured with the close spec, within the world's only external tolerance of 2um and surface roughness Ra0.03. It has a lifespan of up to 5 times than of conventional metal plungers and is excellent for durability and leak prevention. Coma Technology Co., Ltd. is can manufacture plungers best quality by realizing perfect roundness, straightness and surface roughness value, also various types of orders can be made according to customer's requirements.



A Company to Create a New Structure
in the Global Market of Semiconductor Industry!

Alumina (Al₂O₃)

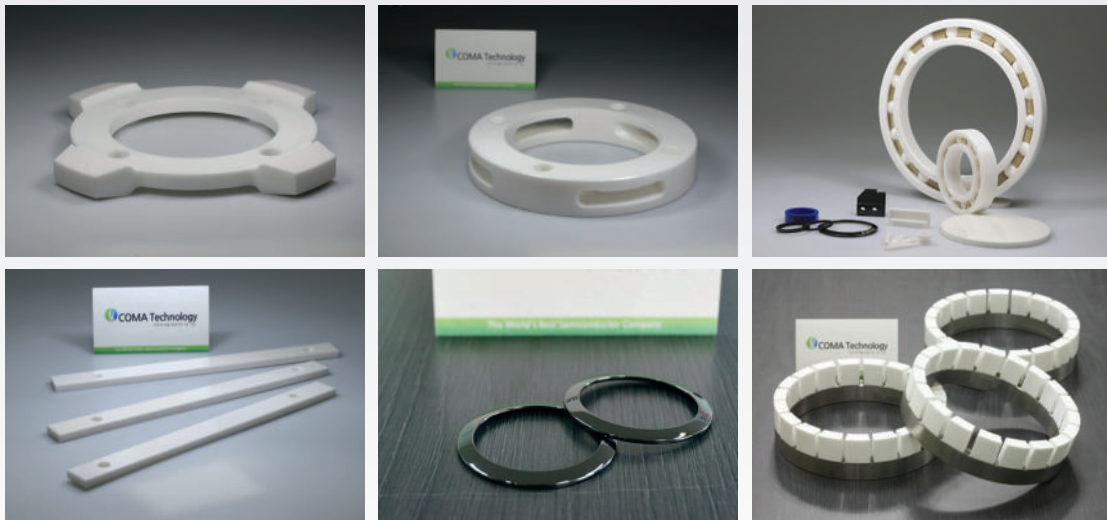
High purity alumina, with its excellent mechanical strength, heat resistance, abrasion resistance, and insulation, has a wide range of application areas not only on various electronic parts, semiconductor processes, spaceship, automobile engineering, but also human body bio-industry like bone implantation.



Groups of Various semiconductor Parts

Zirconia (ZrO₂)

Zirconia is a kind of fine ceramics. Which is very close to metal and can be replaced by complementing the shortcomings of metals due to its excellent mechanical properties.



Silicon Carbide (SiC)

SiC materials have high thermal conductivity, hardness, plasma resistance, oxidation resistance, abrasion resistance, corrosion resistance, high temperature stability and thermal shock resistance.



A Company to Create a New Structure
in the Global Market of Semiconductor Industry!

A Company to Create a New Structure in the Global Market of Semiconductor Industry!



[HEAD OFFICE · FACTORY]

Address. 82-14, 3 Gongdan 3-ro, Gumi-si,
Gyeongsangbuk-do, 39414, Republic of Korea
Telephone. 82-70-4432-9432
Fax. 82-54-473-1765
E-mail. cmt@comatechnology.com

[DONGTAN OFFICE]

Address. 602, Dongtan Giheung-ro, Hwasung-si,
Gyeonggi-do, 18469, Republic of Korea
Telephone. 82-70-4432-9431
E-mail. jh.kim@comatechnology.com

Website. www.comatechnology.com