MICROPORE

Creating Shared Value through
Porous Ceramics Technology

micropore

micropore co.,ltd.

01 INTRODUCTION

HISTORY

Micropor Inc. has been commercializing products such as ceramic vacuum chucks, backlight vacuum chucks, non-contact transfer units, thermal insulation materials for heat treatment equipment, gas filters for semiconductors, and porous crucibles for cathode materials to achieve domestic production of semiconductor/display component materials.

Moving forward, we aim to drive innovative growth as a core player in Korea's component and materials industry, leading the Fourth Industrial Revolution.

2000.12	Environmental Materials Research Institute Incorporated Hanyang University Laboratory Start-up Company
2001.08	micropore Co., Ltd. Corporate Name Change
2006.08	Development of Ceramic Foam Materials for Fuel Cells
2008.01	Supply of high-temperature ceramic insulation materials for hydrogen applications
2010.02	Development of a Catalytic Filter for VOC and Formaldehyde Removal
2013.12	Supply of Ceramic Dust Collection Filters
2016.10	Development of Insulation Materials for Display Heat Treatment Equipment
2017.09	Commencement of Operations at Cheonan Asan Factory
2017.12	Venture Company Certification (Small Industry Promotion Co.)
2019.03	Establishment of Corporate Research Institute
2019.05	Delivery of Insulation Materials for 8th Generation Glass Heat Treatment Equipment
2019.08	Certification as a Specialized Component Materials Company (Ministry of Trade, Industry and Energy)
2020.03	Development of Breathable Lightweight Crucibles
2020.06	TI-2 Selected as Outstanding Technology Evaluation Company Selected for the Ministry of Trade, Industry and Energy's Materials and Components Technology Development Project
2021.12	Expansion and relocation of the Gyeonggi Hwaseong factory
2022.05	Development of Korea's first transmissive vacuum chuck
2022.08	First delivery and full-scale production of transmissive vacuum chucks
2023.05	ITO Film Laser Patterning Large-Area Vacuum Chuck Delivery (1550 mm x 1950 mm)
2023.07	S Company Supplier Registration
2023.05	Heater Vacuum Chuck Development and Delivery (S Company)

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02 TECHNOLOGY

Porous Ceramic Material Technology Innovation Company

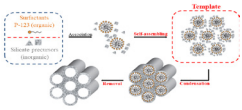
Korea's Only Specialized Porous Ceramic Company

Ceramic Vacuum Chucks · Backlight Vacuum Chucks · Non-Contact Levitation Units · Insulation Materials for Heat Treatment Equipment · Gas Filters for Semiconductors, etc.

Ceramic Internal Pore Formation Technology

Synthesis of Nanoporous Silica via Sequential Synthesis

Nano Pores (Nano pore, < 30 nm)



Micropores smaller than 10 nm (100 Å) are manufactured using a surfactant self-assembling reaction method (see figure).
For example, nanoporous silica is created by heat-treating a template formed through the self-assembly of silicate ions and surfactants in solution, leaving behind pores where the surfactants once occupied (hydrothermal synthesis). Nanoporous materials in this size range are widely used as separation membranes and nanocatalysts.

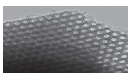
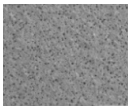
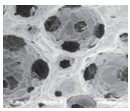
Mesopore, < 30 μm

Pores in this range can be produced through sintering processes that rely on the combustion of combustible materials within the ceramic or the interstitial voids between particles. Our micropore vacuum chuck line offers high permeability with pore sizes ranging from 7 to 15 μm. The pore structure of the filtration membranes used in ceramic filters also falls within this range.

Macro pore, < 300 μm

These products are manufactured using Microporous' proprietary slurry foaming technology, in which tiny bubbles introduced into the dispersed slurry remain as pores in the final structure. In porous ceramics, these internal pores exhibit significantly lower thermal conductivity than the solid matrix, providing strong thermal insulation properties. Within the Microporous product line, the pores found in thermal insulation materials for heat-treatment equipment and in the support layers of semiconductor gas filters fall into this category.

Product Classification by Pore Size

Product	Pore Photo	Pore size	Application Areas	Reference
· Nano Catalyst · Separation Membrane		Nano-sized pores (2-30 nm)	· Catalyst Support · Secondary Battery Separator	Catalog 13 p
· Backlight Vacuum Chuck · Ceramic Vacuum Chuck · Non-contact Levitation Unit		Mezopore (7 – 15 μm)	· Semiconductor / PCB Inspection Equipment · Laser Processing Equipment · OLED and Glass Transfer Equipment · Semiconductor Gas Filters	Catalog 4 - 7 p
· Heat Treatment Equipment Insulation · Semiconductor Gas Filter · Crucible for Anode Material Manufacturing		Macro Pore (30 – 120 μm)	· Display Heat Treatment Equipment · NOX, SOXDust Removal · Crucible for Anode Material Manufacturing	Catalog 8 - 12 p

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03 PRODUCT

Microporous Product Line

Universal Ceramic Vacuum Chuck

Pore TechGen

Ceramic Vacuum Chuck

This vacuum chuck replaces conventional metal suction plates with porous ceramics featuring fine, uniform pores. Compared to competing products, it delivers markedly higher transmission rates and more consistent adhesion. It can also be produced in large formats exceeding 500 mm × 500 mm. In addition, we offer specialized vacuum chucks, including light-transmitting models and thermal-shock-resistant variants.

Ceramic Internal Pore Formation Technology

- Capable of producing large-area discs exceeding 650 x 650 using proprietary micropore molding technology
- Able to manufacture pads larger than 4,000 × 3,500 mm with uniform bonding across wide surfaces
- Ensures uniform adhesion across the entire surface with no partial distortion during attachment
- Prevents electrostatic discharge during processing by selecting materials with optimized surface resistivity
- For white-color variants, offers ceramic pads with high fracture toughness that resist laser light exposure

Application Fields

- Wafer and film automatic inspection equipment
- Processing equipment such as polishing, printing, and cleaning
- Protective film removal and attachment equipment
- Laser cutting equipment

Porous ceramic pad

Key Specifications

Specifications		Value	Unit	Remark
Ceramic pad Properties	Bulk density	2.0	[g/cm^3]	Primary material : Alumina
	Bending strength	86	[MPa]	
	Surface resistance	10^6 ~ 10^9	[Ω/sq]	
	Surface roughness	1 ~ 2	[μm]	Standard : Ra
	Surface hardness	> 95	[HS]	
	Pore size	5 ~ 15	[μm]	
	Porosity	45 ~ 47	[%]	
	Color	Black, White	[-]	

Transparent vacuum chuck

PoreTechVision

Back Light Vacuum Chuck

The light-transmitting vacuum chuck is Korea's first ceramic vacuum chuck to combine both light transmittance and adsorption capabilities. This innovative module is used in inspection and alignment equipment for transparent films, glass, and PCBs.

Product Features

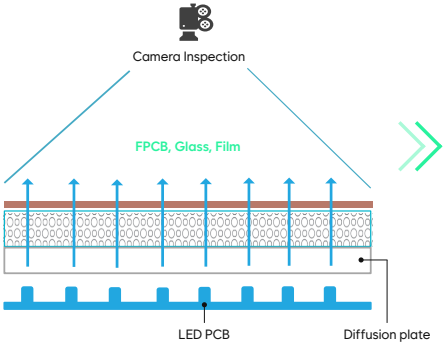
High light transmittance of approximately **40%**

he **only product in Korea** offering both backlight diffusion and gas permeability effects

Specially polished surface roughness control prevents scratches on adhered materials

Uniform pore distribution ensures stable full-surface adhesion and allows partial attachment

Product Principle



PCB Inspection Floodlight Vacuum Chuck

Application Areas

PCB via hole inspection equipment

Edge inspection equipment using vision systems

Key Specifications

Specifications		Value	Unit	Remark
Light transmittance		> 10	[%]	3t
Ceramic pad Properties	Bulk density	1.5 ~ 2.0	[g/cm^3]	
	Bending strength	32	[MPa]	
	Surface roughness	< 3	[μm]	Standard : Ra
	Pore size	7 ~ 15	[μm]	
	Porosity	40 ~ 50	[%]	
	Color	White	[-]	

Heater Vacuum Chuck

PoreTechHeater

Ceramic heater vacuum chuck

This heater-embedded ceramic vacuum chuck is the first of its kind developed in Korea. Featuring a special low-thermal-expansion ceramic pad designed for high temperatures up to 450°C, it can reliably withstand hot-air environments reaching 300°C.

Product Features

Equipped with special low–thermal-expansion ceramic pads that remain stable at temperatures above

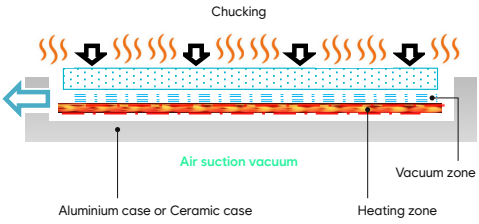
450°C

A temperature-dispersion–optimized design ensures uniform temperature deviation within

±2.5°C

Uniform pore distribution provides stable full-surface adhesion and allows partial attachment

Product Principle

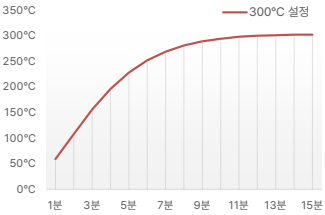


Fields of Application

Process for soldering chips/MLCCs onto PCB boards

Process for bonding film using urethane adhesive with heater heat

Key Specifications



Power consumption at 120°C heating	2W / cm^2
ex) Power consumption of 280×120 heater vacuum chuck: approx. 750W	
Heating rate	Configurable (negotiable)
Holding time per heating stage	Configurable (negotiable)
Operating voltage	220V

Air Float Stage

Pore TechGen

Air Floating Stage

Air-cushion stages utilizing porous ceramics can be manufactured in materials and geometries tailored to specific applications. By controlling the pore structure according to the weight of the suspended object, internal air pressure, flow rate, and suspension height can be precisely adjusted. An automated control system can also be developed to detect object position via camera and regulate the air cushion accordingly. In addition, because the base is made from sintered ceramic, fine particulate generation is significantly lower than in conventional products made from materials such as carbon.

Product Features

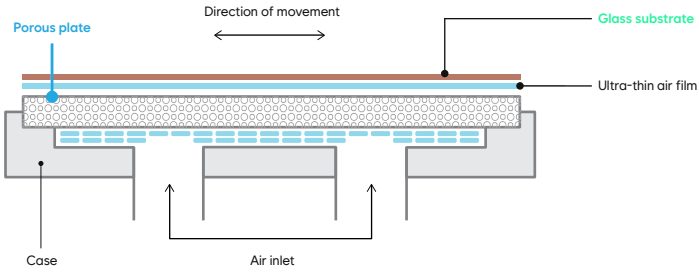
Material and form selection tailored to application needs

Enables non-contact movement via air cushion

Compatible with automated control systems using cameras and computer programs

Suitable for glass and film transfer, processing, and inspection equipment systems

Product Principle

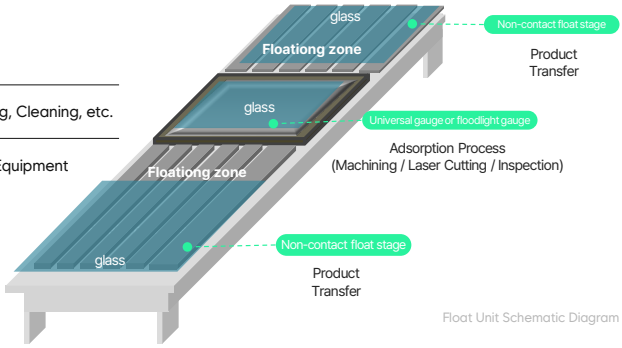


Fields of Application

Wafer and Film Transfer Equipment

Processing Equipment for Polishing, Printing, Cleaning, etc.

Protective Film Removal and Attachment Equipment



Float Unit Schematic Diagram

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04 PRODUCT

Macro Pore Product Line

Ceramic Foam

3Hx

3HX refers to the only domestically developed porous ceramic based on ceramic foam.
3HX is not only suitable for various ceramic applications but also features a uniform internal pore structure and high durability.It is applied in diverse fields such as insulation materials for heat treatment equipment, gas filters for semiconductors, permeable crucibles for cathode material manufacturing, and catalyst carriers.

ex : 3HX Product Naming

3H s, 400k

- 3H-Cellite
- s: Main ingredient
- 400k: Bulk density

Main Ingredient Abbreviation

- **S** Silica (SiO_2)
- **A** Alumina (Al_2O_3)
- **C** Silicon Carbide (SiC)
- **M** Mullite ($3Al_2O_3 \cdot 2SiO_2$)
- **Z** Zirconia (ZrO_2)

3HX Series

3HX products are manufactured using various inorganic raw materials, including silica, mullite, alumina, and zirconia. We also customize products to customer requirements by precisely controlling pore characteristics such as porosity, pore size, and pore shape.

Application Scope of Ceramic Foam 3HX

X = S / A / C / M / Z

Model	Chemical formula	Application	Max. applicable temp.	Bulk density*	Porosity
$3H_S$	SiO_2	Ceramic insulation	1,200 °C	300k	90%
				400k	85%
				500k	80%
				600k	75%
				700k	70%
$3H_M$	$3Al_2O_3 \cdot 2SiO_2$	Crucible, Saggar	1,600 °C	500k	85%
				600k	80%
				800k	75%
				1,000k	70%
$3H_A$	Al_2O_3	High temp. insulation, Ceramic vacuum chuck	1,800 °C	700k	85%
				800k	80%
				1,000k	75%
				1,300k	70%
$3H_C$	SiC	Parts material for semiconductor	2,000 °C	500k	85%
				600k	80%
				800k	75%
				1,000k	70%
$3H_Z$	ZrO_2	Ultra high temp. insulation	2,200 °C	1,000k	85%
				1,100k	80%
				1,400k	75%

*400k refers to 0.4 g/cm^3, 500k refers to 0.5 g/cm^3. (100k = 0.1 g/cm^3)

Semiconductor Gas Filter $3H_A$

Gas filters for semiconductors

Our ceramic gas filters not only offer superior backwashing capability compared to conventional fiber or particulate filters but also exhibit excellent fluid permeability characteristics. The raw material is 99.9% high-purity alumina, and the high-temperature sintering process at 1,630° C or above ensures outstanding chemical resistance and durability. They can be manufactured in various shapes, such as discs and tubes.

Product Features

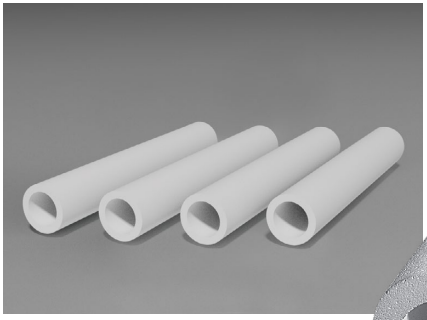
High-purity alumina	Al_2O_3	**99.9%**
Transmittance	· support base 900 ~ 1,000 × 10^{-3} m^2 · Surface filter membrane 200 × 10^{-13} m^2	

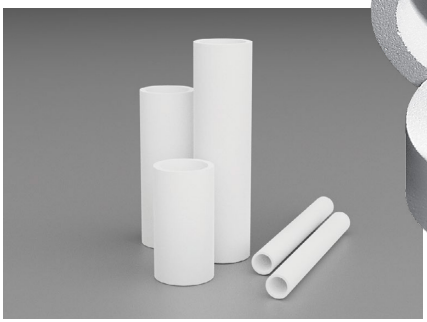
Fields of Application

Gas Filter for Semiconductors

Fine Dust Filter

NOX / SOX Removable filter





micropore Co., Ltd. is a technology-specialized venture company established to achieve the localization of core components and materials underpinning the Fourth Industrial Revolution. Based on the microporous material manufacturing technology developed over the past 20 years in university laboratories, we manufacture ceramic vacuum chucks, backlight vacuum chucks, non-contact transfer units, thermal insulation materials for semiconductor/display heat treatment equipment, semiconductor gas filters, breathable refractory plates, and catalyst carriers.

Moving forward, we aim to become a central player in Korea's ceramic component and materials industry, driving the nation's next wave of innovative growth.

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