

# SUNSPHERE

Spherical fine particle

Our company is Asahi Glass Co., Ltd. groups

**ver. 2010.01**



*AGC Si-Tech, Co., Ltd. provides  
unique silica products and material solutions  
for customer's various demands.*

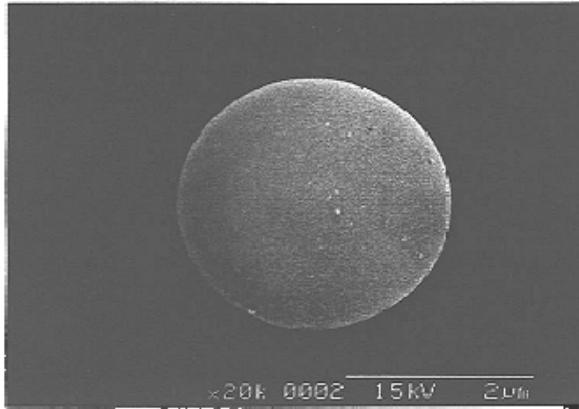
# Characteristics of SUNSPHERE

- High spherical particle
  - Non-agglutinate, high spherical particle
  - The rolling effect gives good touchiness
- Variety of products
  - Mean particle size: 3 – 20  $\mu\text{m}$ ,
  - Oil absorption capacity: 30 – 400 mL/100g
  - Various grade we provide
- High safeness
  - Safety Amorphous silica and includes no crystalline silica

# Particle configuration and intensity

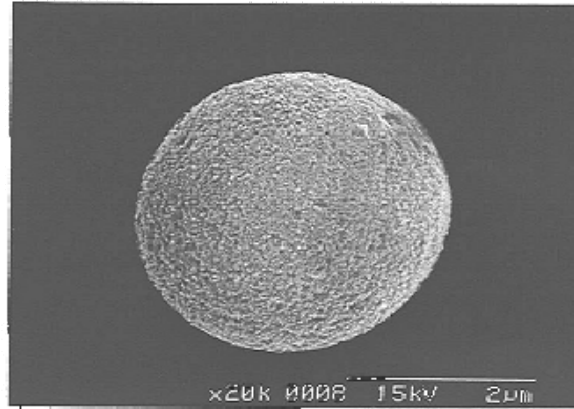
(SEM images)

NP-30



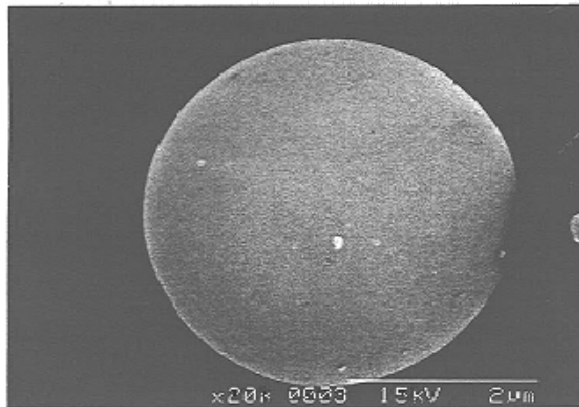
※Particle strength: 1900MPa

H-32



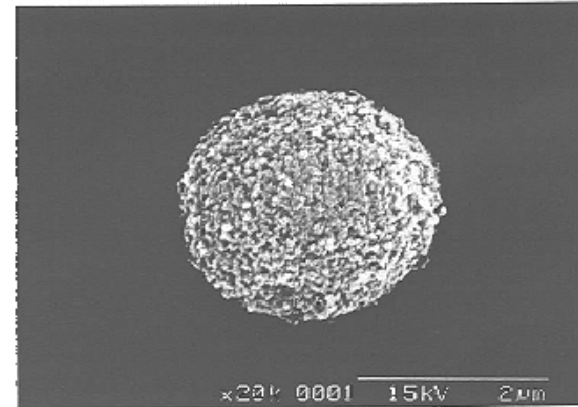
4MPa

H-31



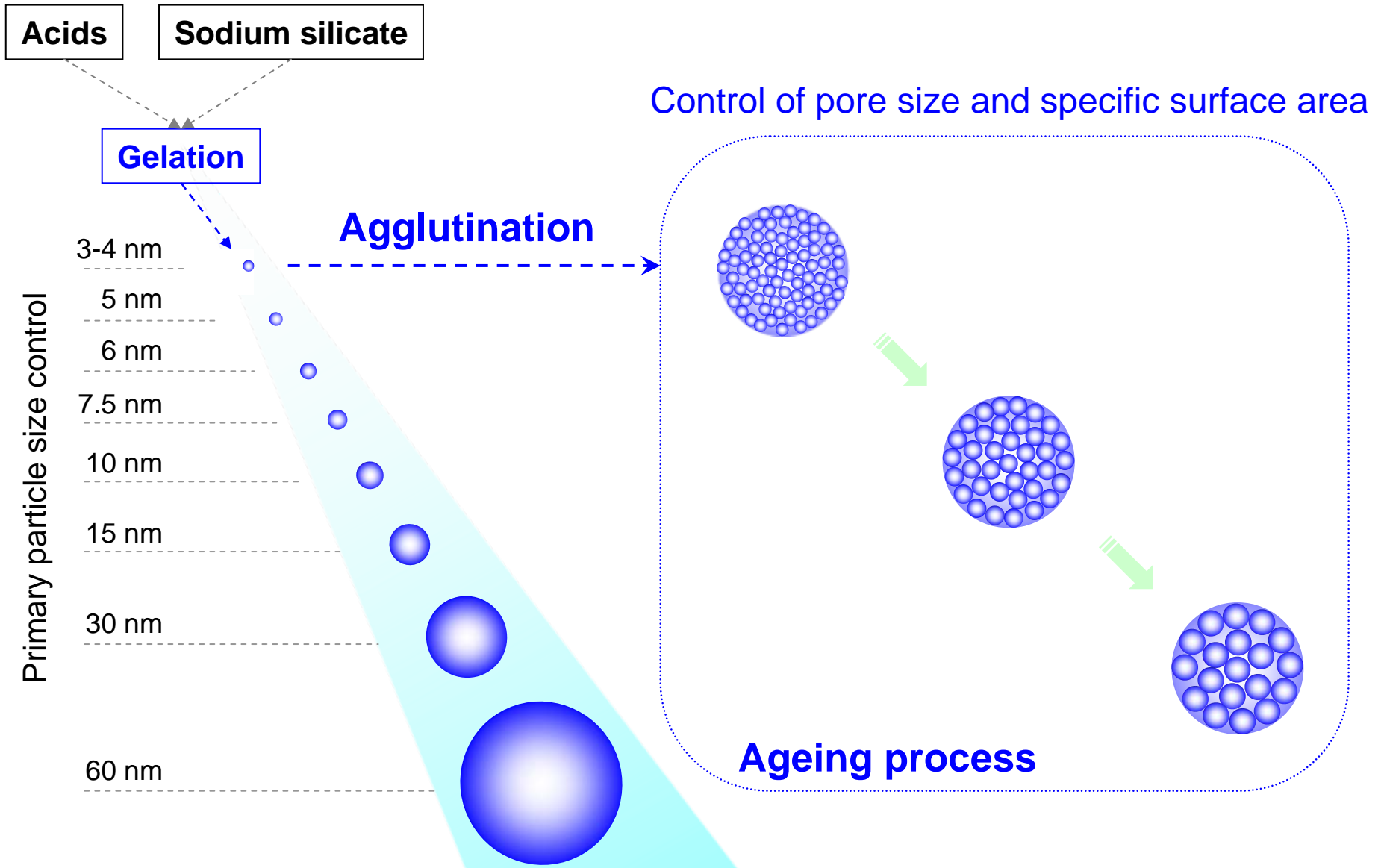
40MPa

H-33



Under minimum limit of detection

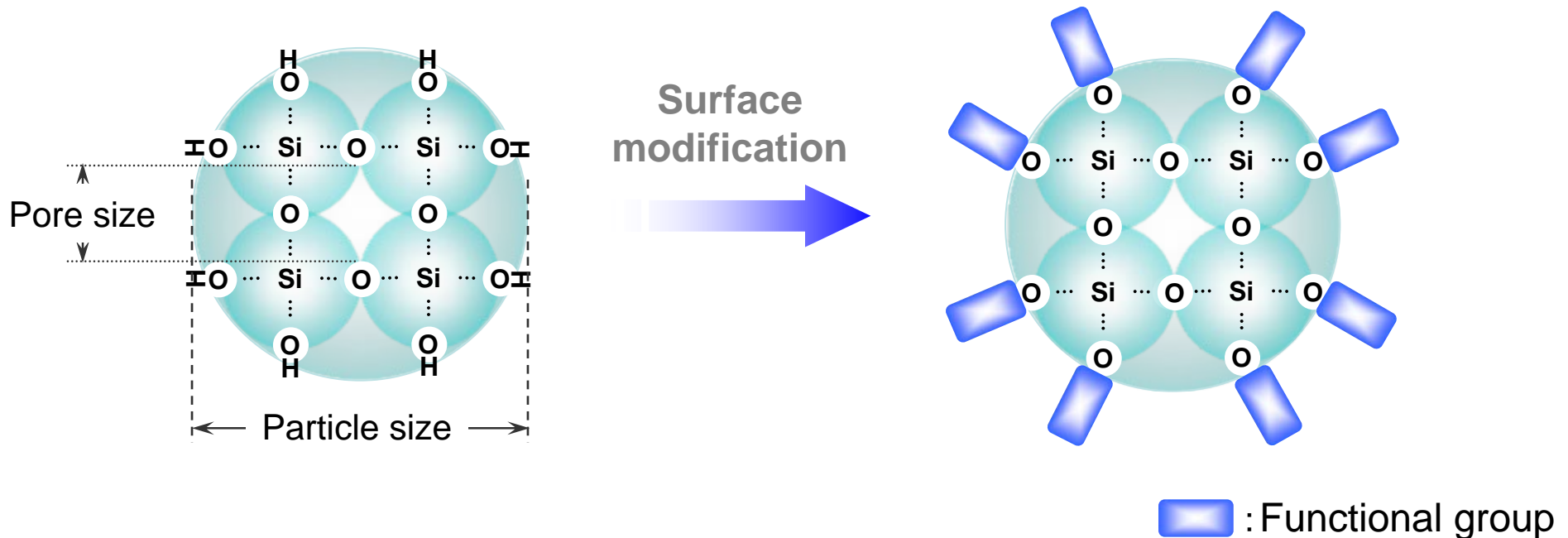
# Diagram of Wet gelation method for Silica



# Silica modified technology

## ➤ Surface modification technology

- ODS,  $\text{NH}_2$  are modified on silanol groups
- Silicone treatment technology
- Titanium oxide/Zinc oxide compound etc.



# SUNSPHERE variety

## ● Multi-porous H series (High Specific Surface Area)

	H-31	H-51	H-121	H-201
Mean particle size ( $\mu\text{m}$ )	3	5	12	20
Specific surface area ( $\text{m}^2/\text{g}$ )	800	800	800	800
Pore volume ( $\text{ml}/\text{g}$ )	1	1	1	1
Pore diameter (nm)	5	5	5	5
Oil absorption ( $\text{ml}/100\text{g}$ )	150	150	150	150

## ● Multi-porous L series (Low Specific Surface Area)

	L-31	L-51
Mean particle size ( $\mu\text{m}$ )	3	5
Specific surface area ( $\text{m}^2/\text{g}$ )	300	300
Pore volume ( $\text{ml}/\text{g}$ )	1	1
Pore diameter (nm)	13	13
Oil absorption ( $\text{ml}/100\text{g}$ )	150	150

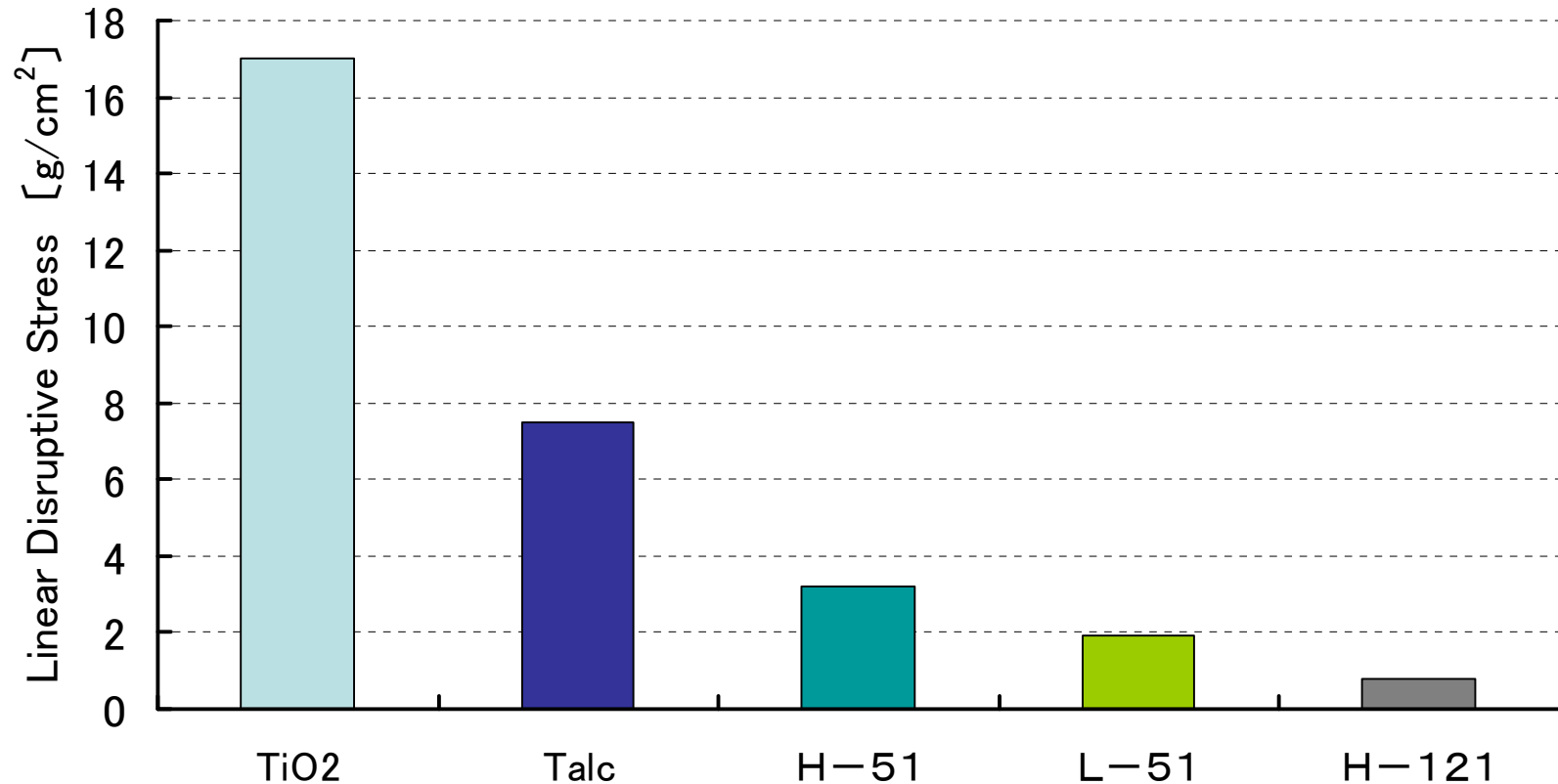
## ● Multi-porous H series (High Oil absorption Capacity)

	H-32	H-52	H-122	H-202	H-33	H-53
Mean particle size ( $\mu\text{m}$ )	3	5	12	20	3	5
Specific surface area ( $\text{m}^2/\text{g}$ )	700	700	700	700	700	700
Pore volume ( $\text{ml}/\text{g}$ )	2	2	2	2	2	2
Pore diameter (nm)	25	25	25	25	30	30
Oil absorption ( $\text{ml}/100\text{g}$ )	300	300	300	300	400	400

## ● Non-porous NP series

	NP-30	NP-100	NP-200
Mean particle size ( $\mu\text{m}$ )	3	10	18
Specific surface area ( $\text{m}^2/\text{g}$ )	40	80	40
Pore volume ( $\text{ml}/\text{g}$ )	0.05	0.1	0.1
Oil absorption ( $\text{ml}/100\text{g}$ )	30	35	40

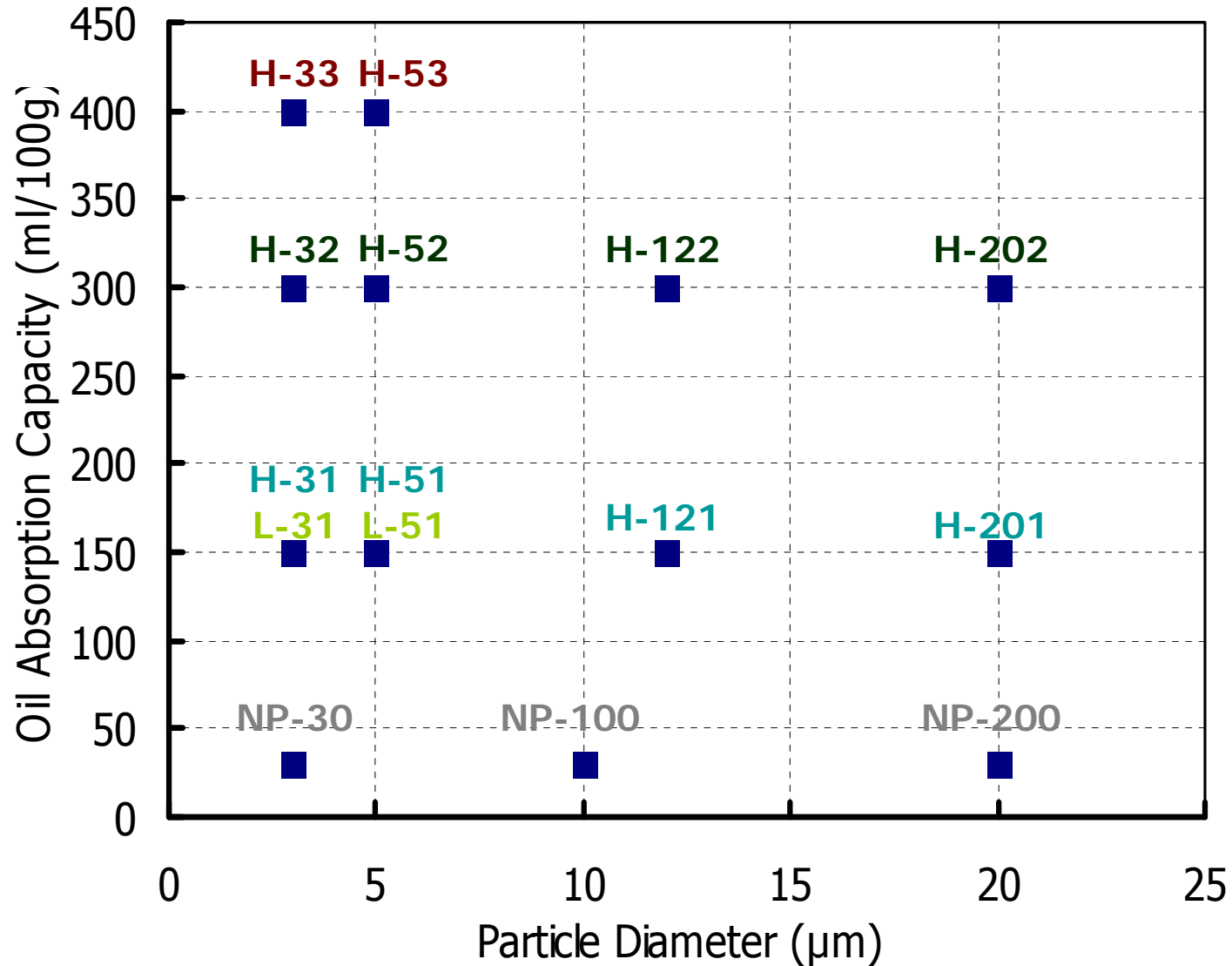
# Linear Disruptive Stress of SUNSPHERE



The linear disruptive stress depends on the friction coefficient and adhesion. SUNSPHERE consists of spherical particles which do not cohere. When blended with a resin, it has a smoother surface than compounds of resin with irregularly shaped particles.



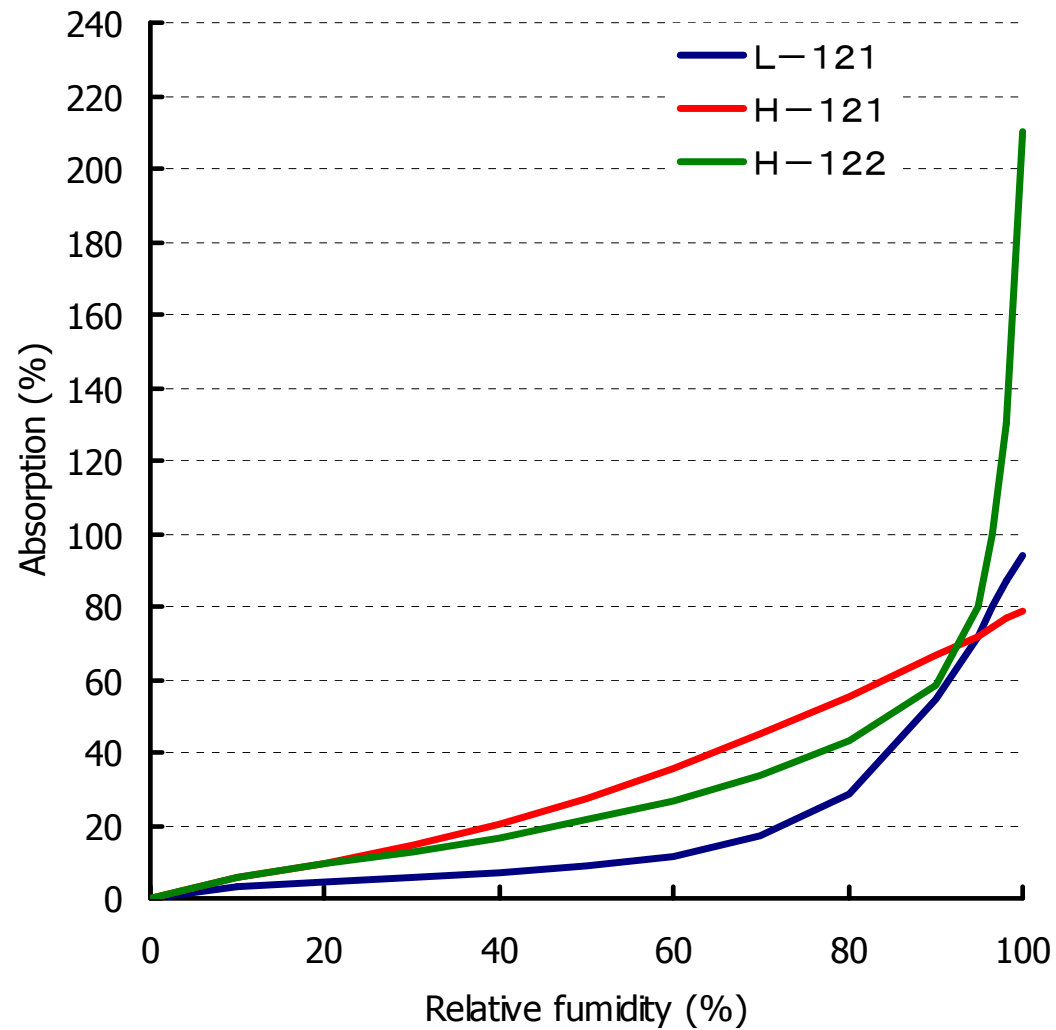
# Relation of oil absorption capacity and Particle diameter



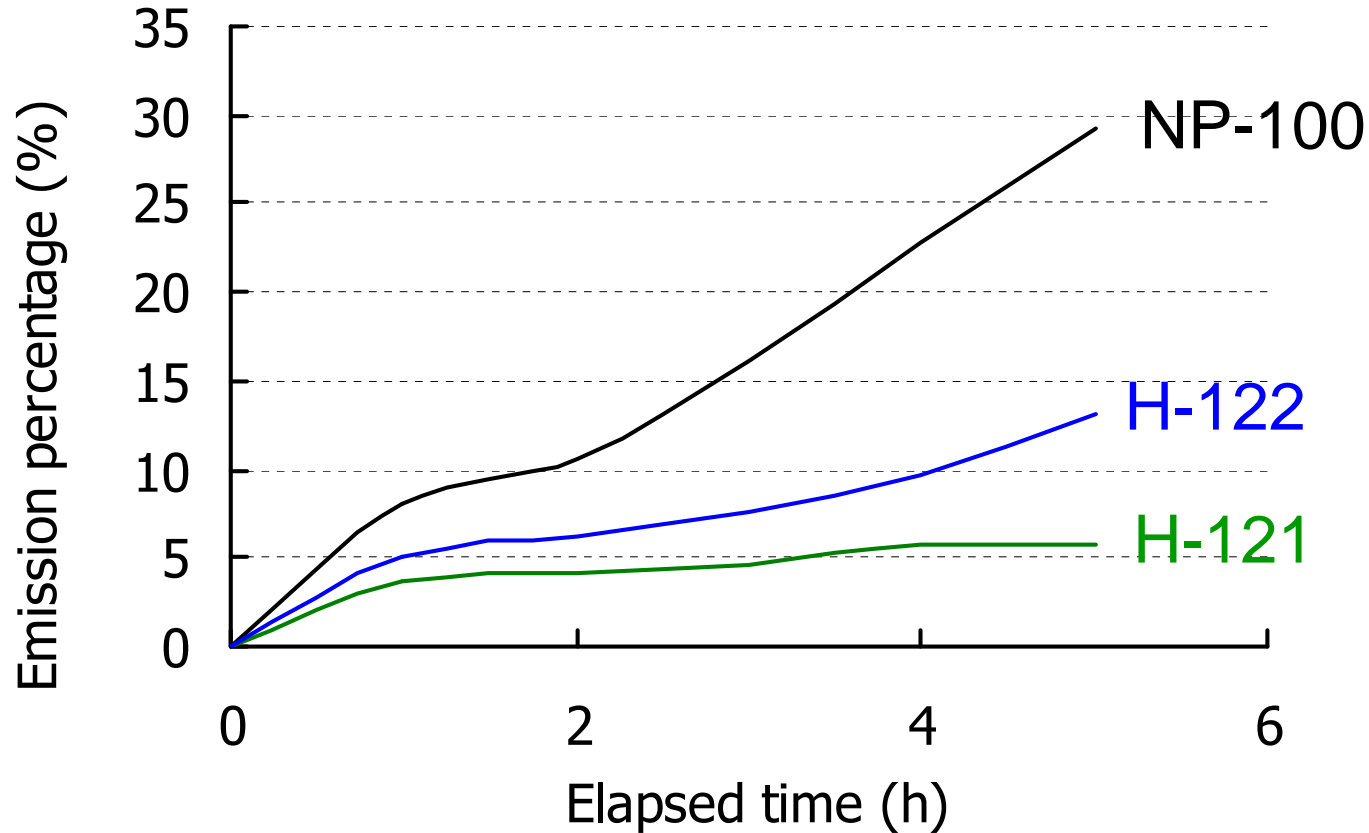
## Silanol density of SUNSPHERE

<b>Type</b>	<b>NP-30</b>	<b>L-31</b>	<b>H-31</b>	<b>H-32</b>	<b>H-33</b>
<b>Specific surface area</b> (m <sup>2</sup> /g)	<b>13</b>	<b>282</b>	<b>845</b>	<b>725</b>	<b>706</b>
<b>Silanol group</b> ( $\mu$ mol/g)	<b>640</b>	<b>4420</b>	<b>6420</b>	<b>6030</b>	<b>5870</b>
<b>Silanol group</b> ( $\mu$ mol/m <sup>2</sup> )	<b>50</b>	<b>16</b>	<b>8</b>	<b>9</b>	<b>8</b>

# Moisture Absorption of SUNSPHERE



# Sustained release test of SUNSPHERE



Fragrance material: amylcinnamaldehyde

Condition: Accelerated test at 105°C

# Control of specific surface area and oil absorption by burning

Burning condition	Specific surface area [m <sup>2</sup> /g]	Oil absorption [ml/100g]
<b>L-51</b>	336	165
850°C × 0.5Hr	203	131
900°C × 0.5Hr	182	111
950°C × 0.5Hr	<b>115</b>	<b>79</b>

L-51-C

Burning condition	Specific surface area [m <sup>2</sup> /g]	Oil absorption [ml/100g]
<b>H-121</b>	811	145
700°C × 0.5Hr	<b>644</b>	<b>122</b>
750°C × 0.5Hr	588	100
800°C × 0.5Hr	311	82

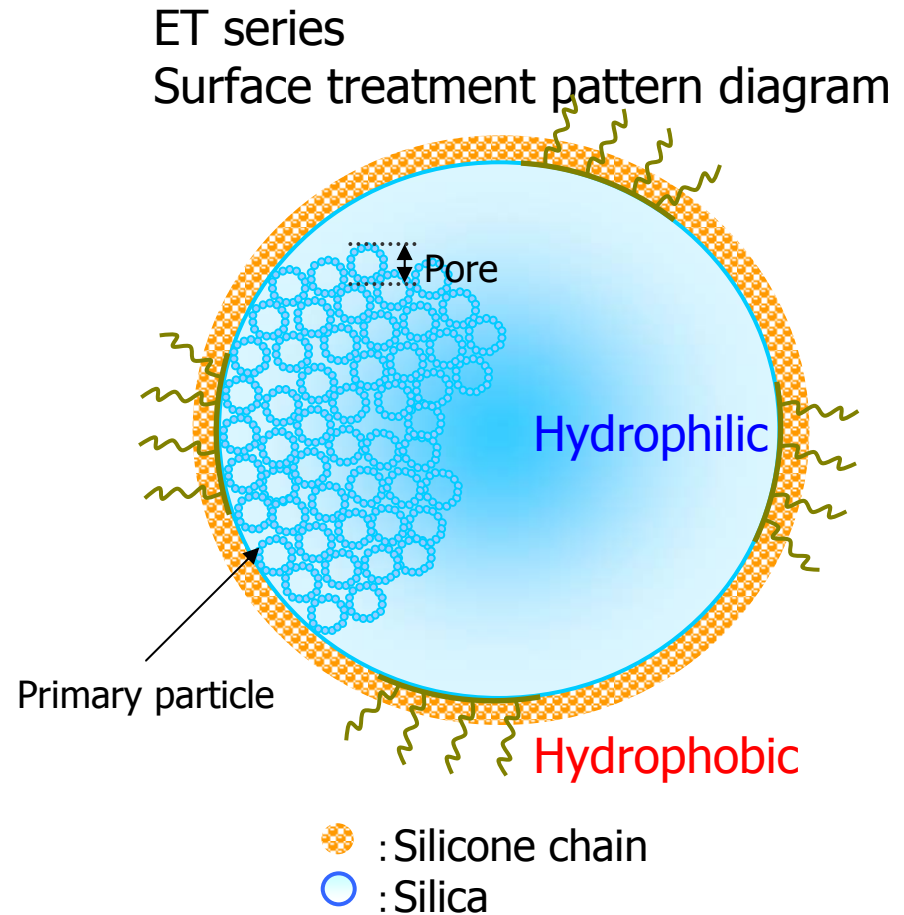
H-121-C1

# Surface modified SUNSPHERE

## ET series

ET series are original surface modified SUNSPHER.

ET series have uniformly-silicone surface so they are hydrophobic



# SUNSPHERE ET property

	<b>SUNSPERE H-121-ET</b>	<b>SUNSPERE H-121</b>
Mean particle size ( $\mu$ m)	<b>12</b>	<b>12</b>
Specific surface area (m <sup>2</sup> /g)	<b>602</b>	<b>847</b>
Oil absorption (mL/100g)	<b>126</b>	<b>161</b>
Hydrophobicity (%)*	<b>35</b>	---
Silicone content (%)	<b>1</b>	---

\*: Ethanol concentration of when the gel floated on the solvent

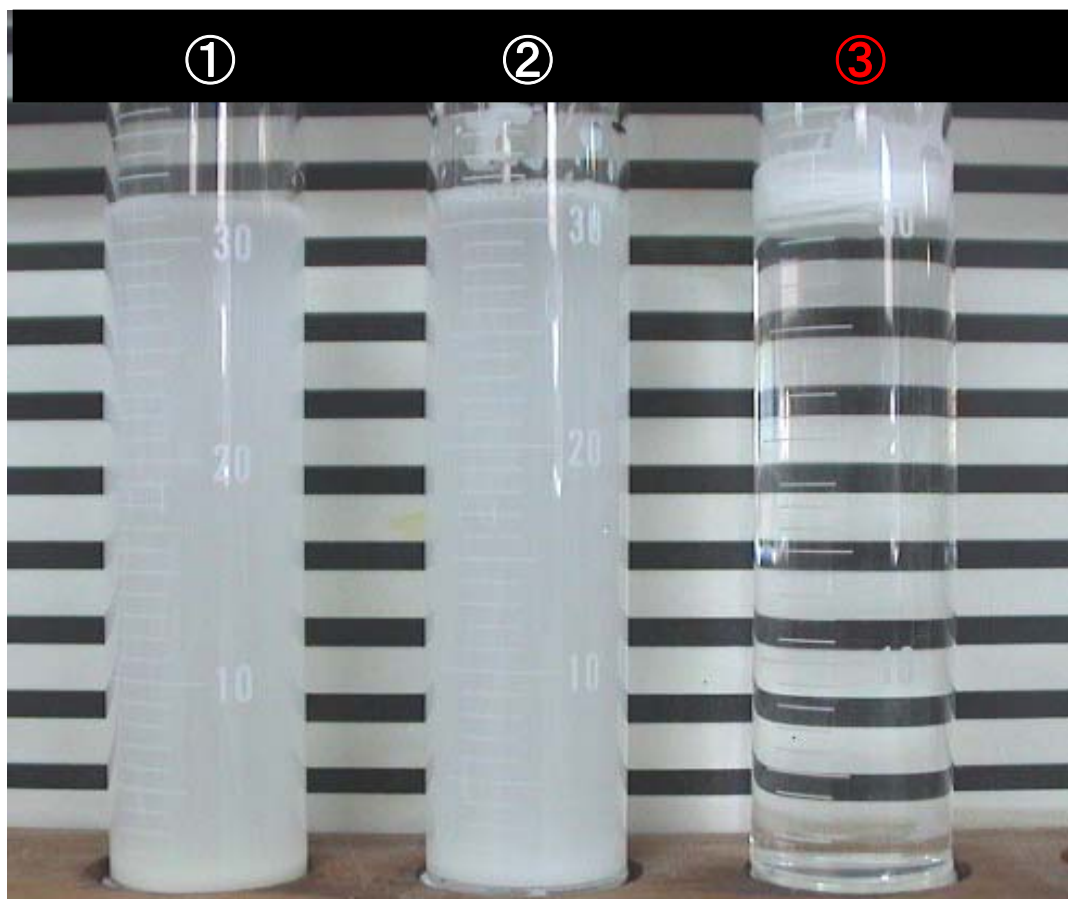
# Variation of ET series

SUNSPHERE	Mean particle size [ $\mu\text{m}$ ]	Specific surface area [ $\text{m}^2/\text{g}$ ]	Pore volume [ $\text{mL}/\text{g}$ ]	Oil absorption [ $\text{mL}/100\text{g}$ ]		Hydrophobicity [%]
				Untreated	Treated	
H-121	12	847	0.9	161	126	35.0
H-51	5	756	0.8	173	119	35.0
H-52	5	703	1.8	336	289	35.0
NP-30 ※	3	34	0.2	28	27	37.5

※Prototype



# Water repellency



①: Non modified

SUNSPHERE H-121

②: Silicone 1%

Mechanochemical treatment

SUNSPHERE H-121

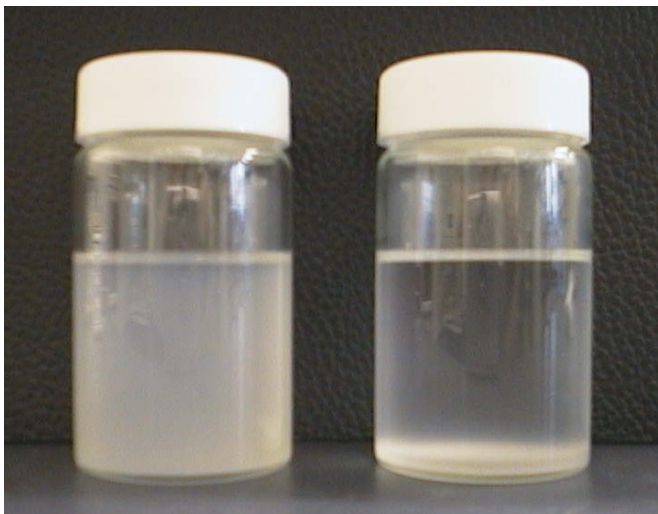
**③: SUNSPHERE H-121-ET  
(Silicone 1% treatment)**

[Method]: Measure 30mL purified water in 50mL nessler tube, and add 1g test powder.  
Then observe condition.

# Dispersion test of Silicone treatment SPP

H-121-ET

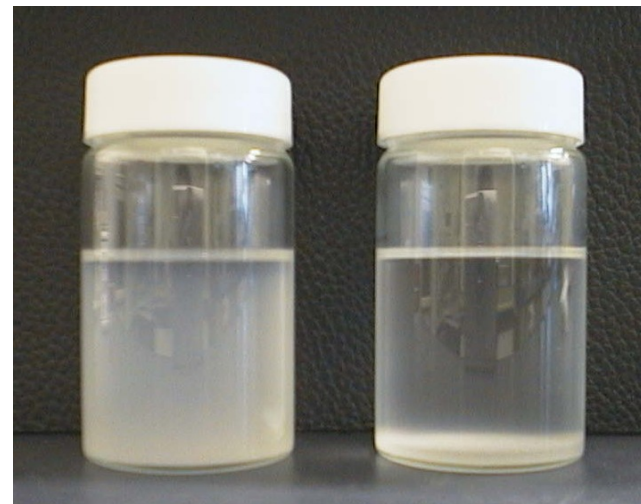
H-121



Leave at rest 1 min.

H-121-ET

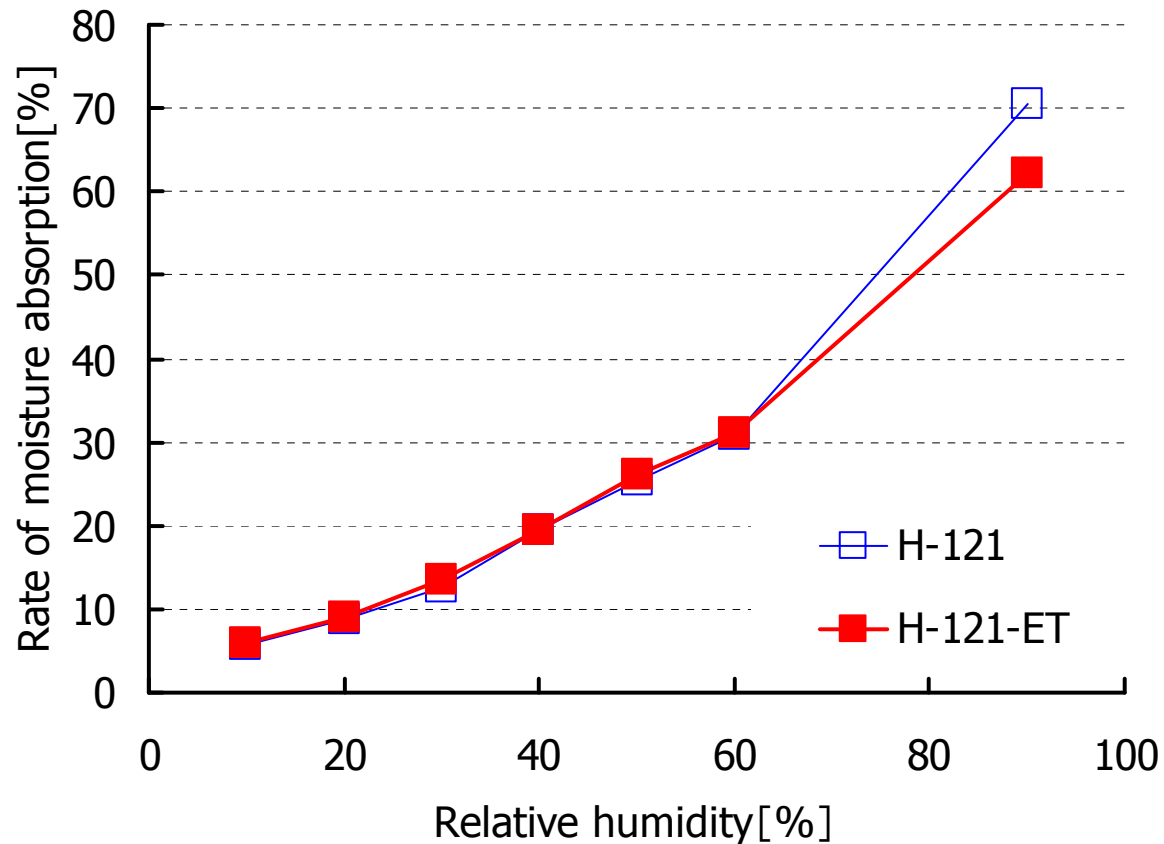
H-121



Leave at rest 3 min

Solvent: Toluene

# Hygroscopicity and moisture retention capability



[Test method]: Spread about 0.3g test sample in petri dish thinly, and stand under relative humidity from 10 to 90 % for 48 hours at 25°C. After 48 hours, measure its gravity and evaluate hygroscopicity of test sample.

# AGC Si-Tech Co., Ltd.

4-1-16 Nihonbasimuromachi Chuo-ku, Tokyo 103-0022 Japan

Person in charge: Yasumasa Asai

Marketing and Sales Division

E-mail :yasumasa-asai@agc.co.jp

Tel:81-3-6214-3833

<http://www.agc-si.com>