DAICEL

Sustainable Value Together

DAICEL CORPORATION

Basic Philosophy

We place great importance on the Basic Principle concept, and in future will continue to hold this concept without being influenced by changing times.

The company making lives better by co-creating value

Sustainable Value Together

Value co-creation ••• Understanding and communicating together with various partners, to jointly create new value

Corporate outline

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Corporate Data

Corporate Name	**DAICEL CORPORATION**
Incorporated:	**September 8, 1919**
Capital:	**36.2 billion yen**
Number of Employees:	**About 2,800 (about 12,000 in the entire Daicel Group)**
Head Office:	**[Osaka]** **Grand Front Osaka Tower-B, 3-1, Ofuka-cho, Kita-ku, Osaka 530-0011, Japan** **[Tokyo]** **JR Shinagawa East Bldg., 18-1, Konan 2-chome, Minato-ku, Tokyo 108-8230, Japan**
Website:	**https://www.daicel.com/en**

Osaka Head Office

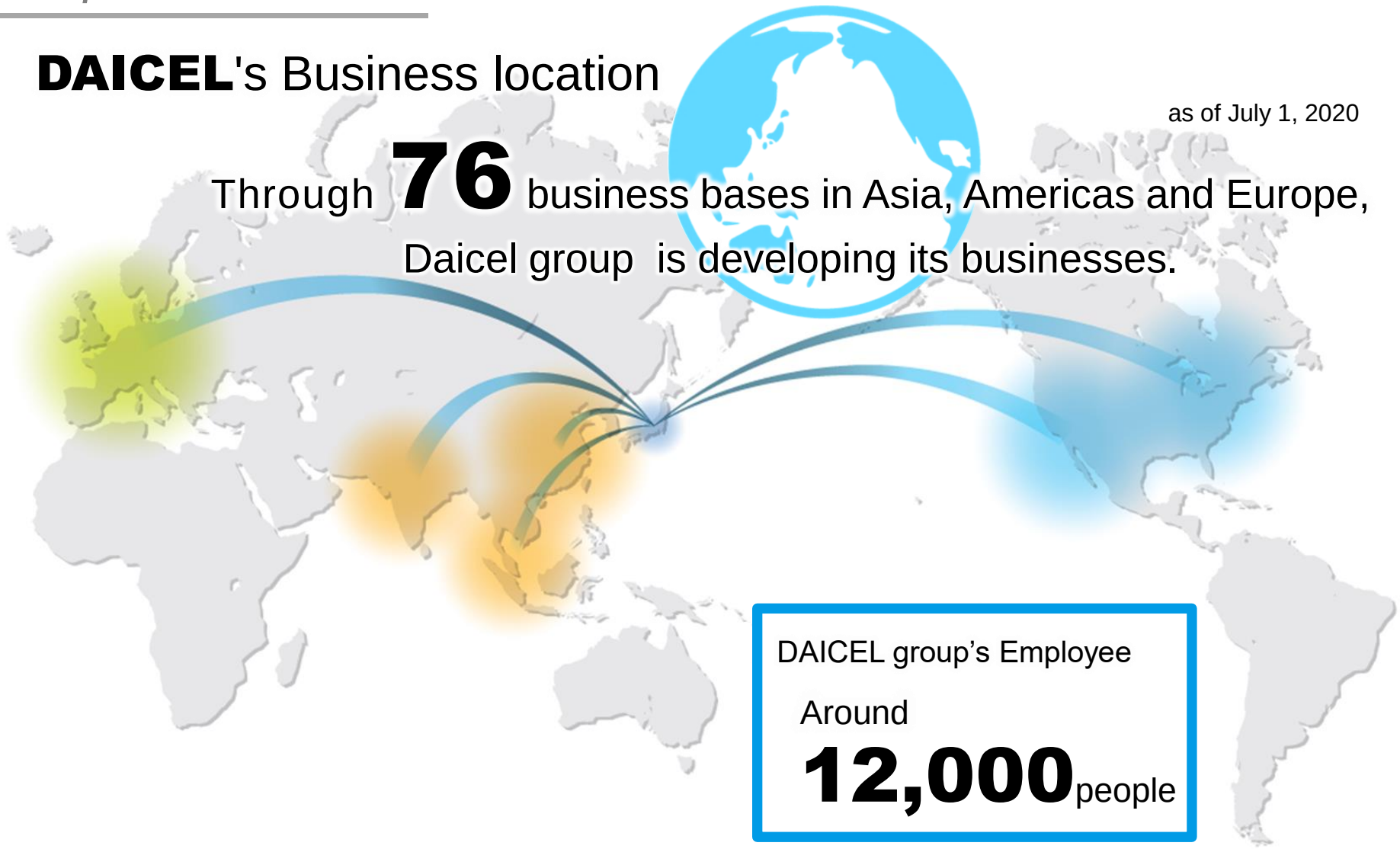
Tokyo Head Office

Corporate outline

DAICEL's Business location

as of July 1, 2020

Through **76** business bases in Asia, Americas and Europe,
Daicel group is developing its businesses.



DAICEL group's Employee

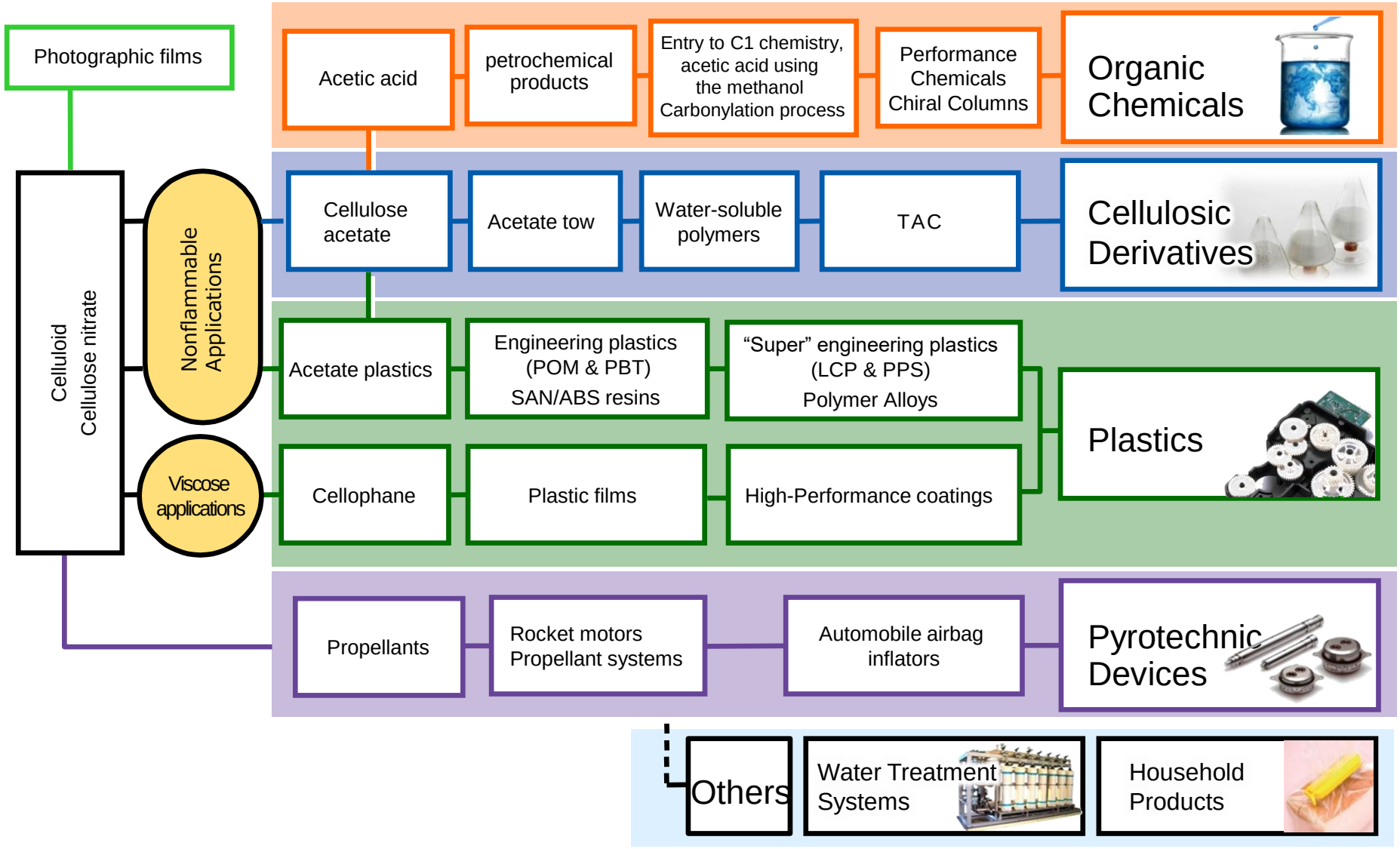
Around

12,000people

In April 2020, Daicel reorganized its business segments.

Business overview

Process of Business Development



Organizational Structure Change (As of April 1, 2020)

We changed from conventional business departments by technologies and products to “Business Units (BUs)” based on target customers and markets on April 1, 2020.

The BUs are classified into two different SBUs – “Value-providing SBUs” and “Material-providing SBU”.

Organic Chemicals

Cellulosic Derivatives

Plastics

Pyrotechnic Devices

Value-providing SBUs

Providing common value to focused market

Material-providing SBU

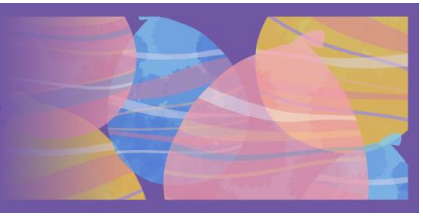
Providing added value through the chain of technologies and materials cultivated over many years

SBU: Strategic Business Unit

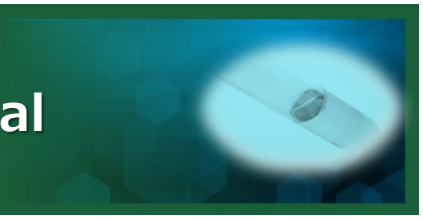
Medical / Healthcare

Smart

Safety



Material



Engineering plastics and polymer products

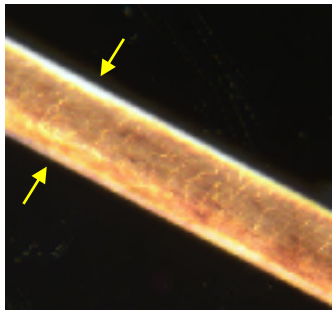
3D-PEIM

Silver nano ink "Picosil"

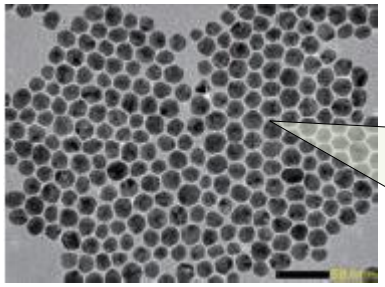
Daicel Corporation
Smart SBU
Sensing BU

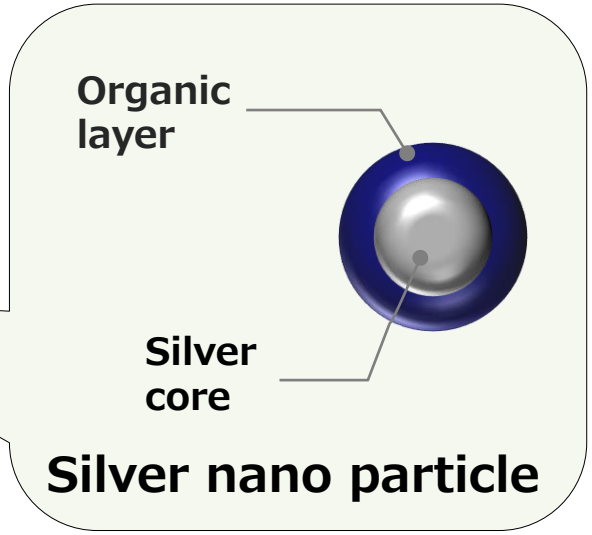
What is silver nano ink ?

Diameter of hair
0.1 mm



Silver nano particle
10 nm





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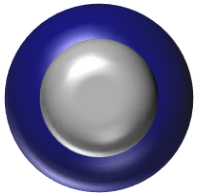
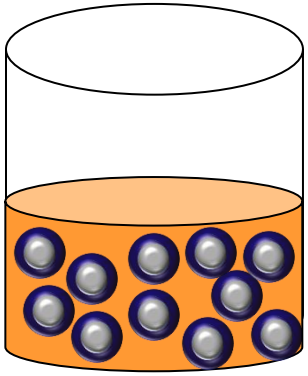


Silver nano particle

+

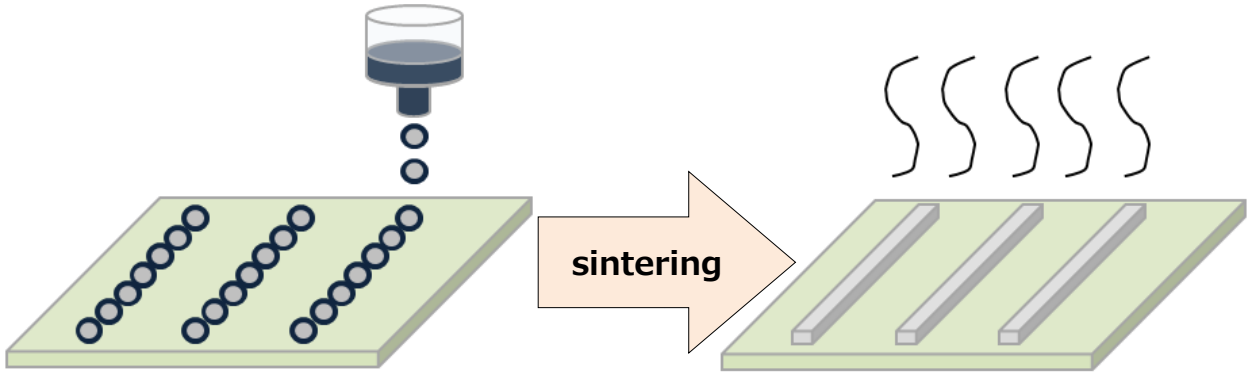
Solvent

(Additive)



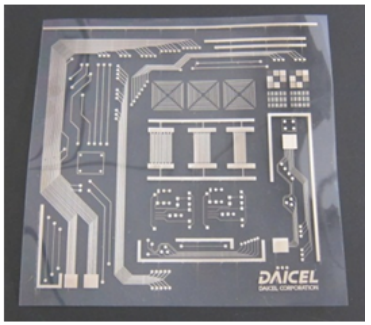
Silver nano ink
"Picosil"

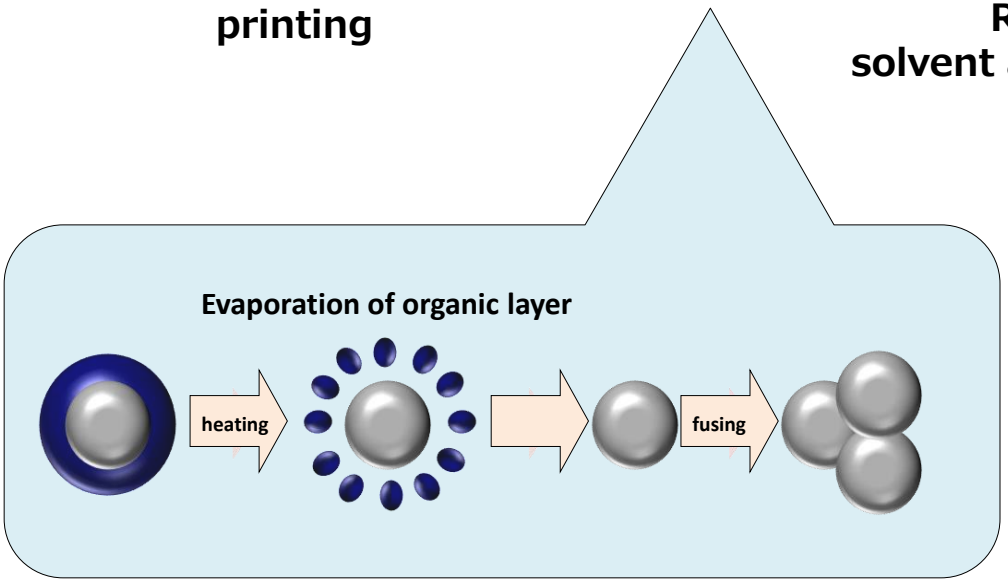
The Feature of "Picosil"

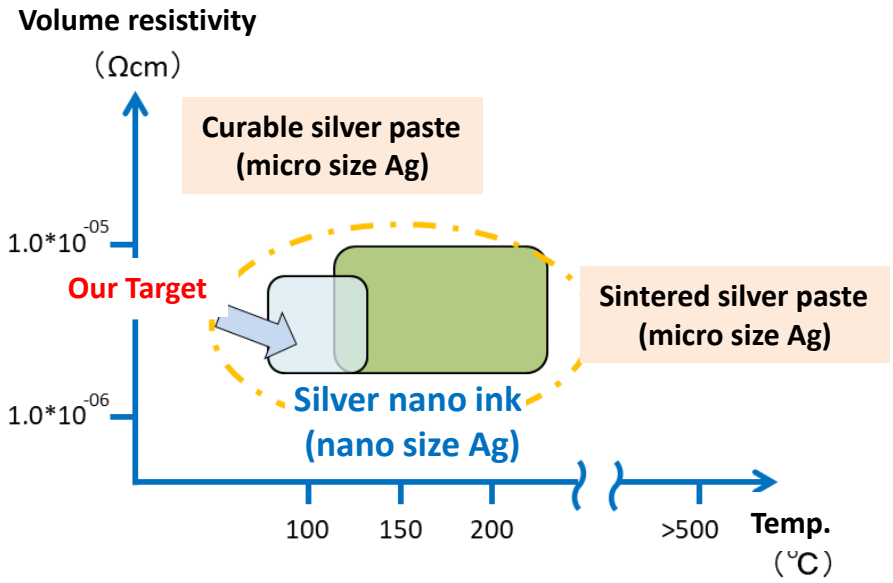


printing

Removing
solvent and organic layer

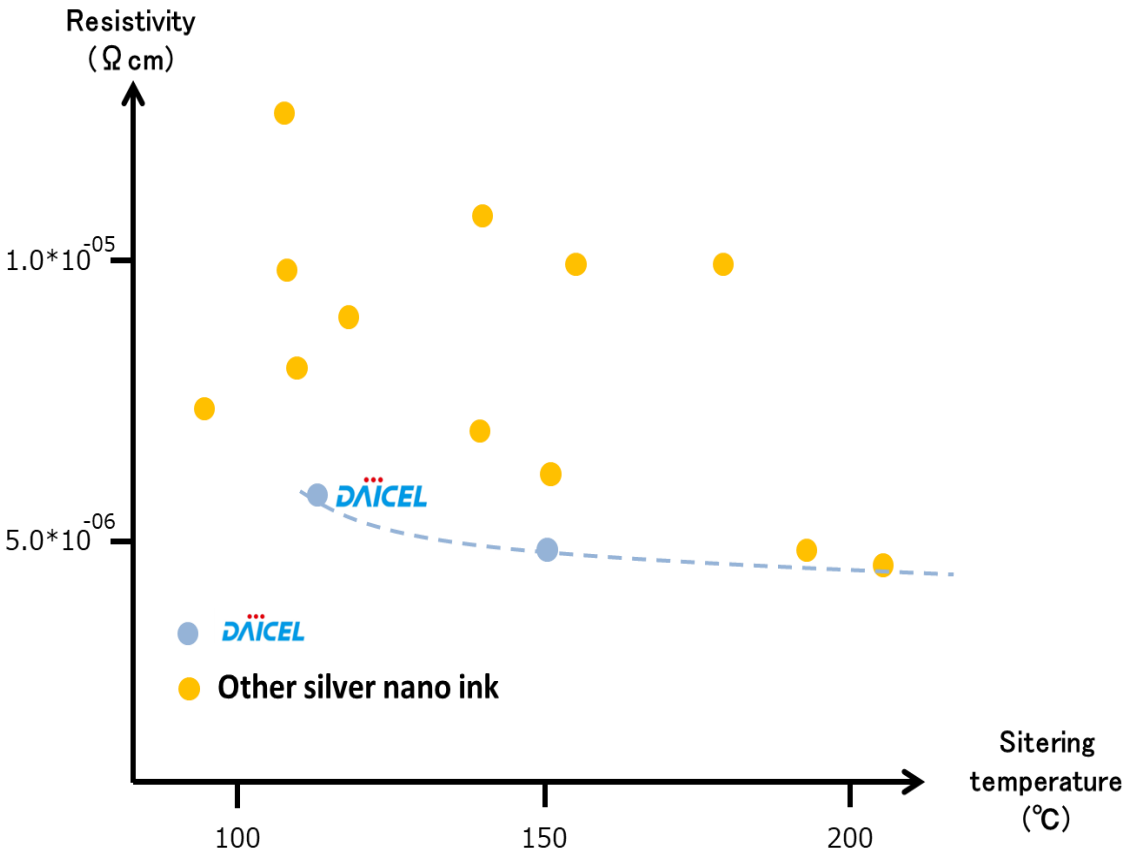






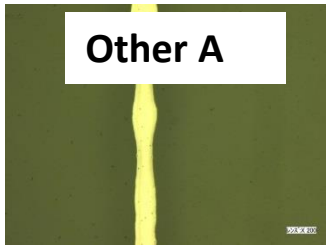
Comparison with other silver nano inks

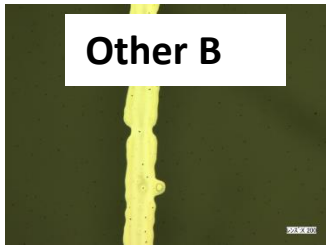
【Resistivity vs sintering temp.】



Low resistivity by sintering at low temperature

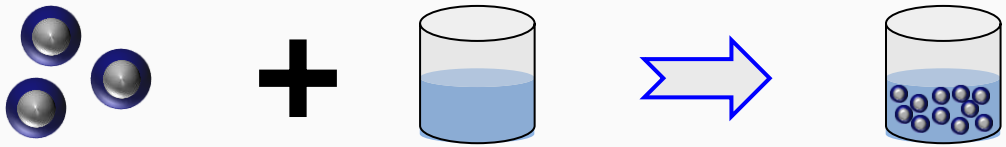
【Printed line by inkjet】



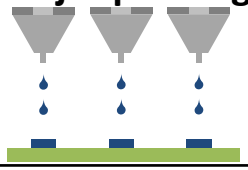
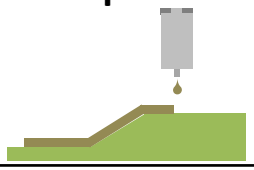
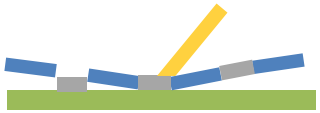


Straight and Sharp line

Lineup of "Picosil" and recommended printing method



Silver nano particle　　Organic solvent　　Picosil : Silver nano ink

product	 **DNS163S**	 **DNS351S**	 **DNS409S**
Viscosity	**Low**		**High**
Recommended Printing method	**Ink jet printing** 	**Despenser** 	**Screen printing** 

*Sample is available from small quant

"Picosil" for Screen printing

Features of "DNS409S"

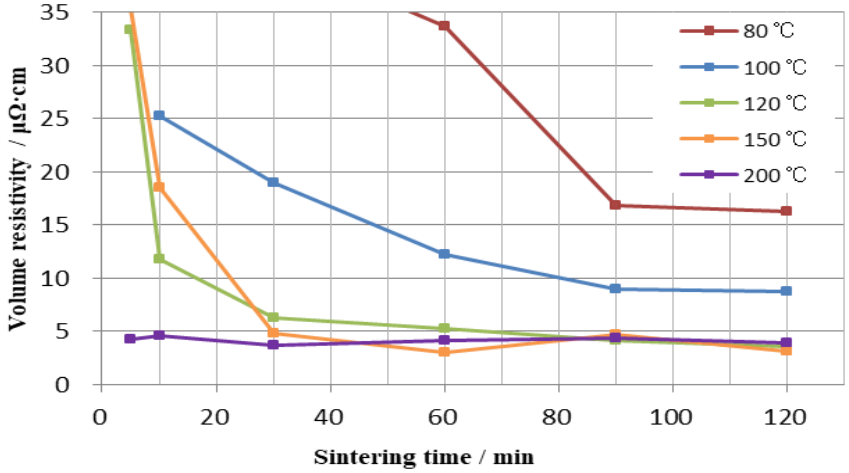
"DNS409S" is designed for screen printing.
It can be sintered at low temperatures and obtain the low resistivity conductive layer.

◆General characteristics

Items	DNS409S
Primary component	Ag particles
Appearance	Dark brown
Solvent composition	Non-water-soluble alcohol

Items	Unit	Value
Volume resistivity	μΩ·cm	6.2
Ag concentration	wt %	67
Viscosity	Pa·s	90

◆Relationship between sintering temperature and volume resistivity



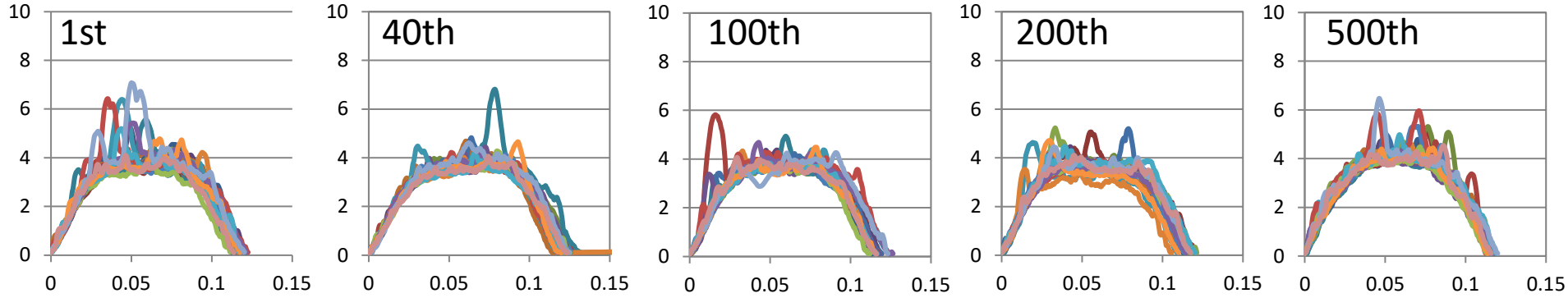
◆Image of packing (Tentative)

- Vessel material: HDPE
- Recommended storage conditions : 5℃

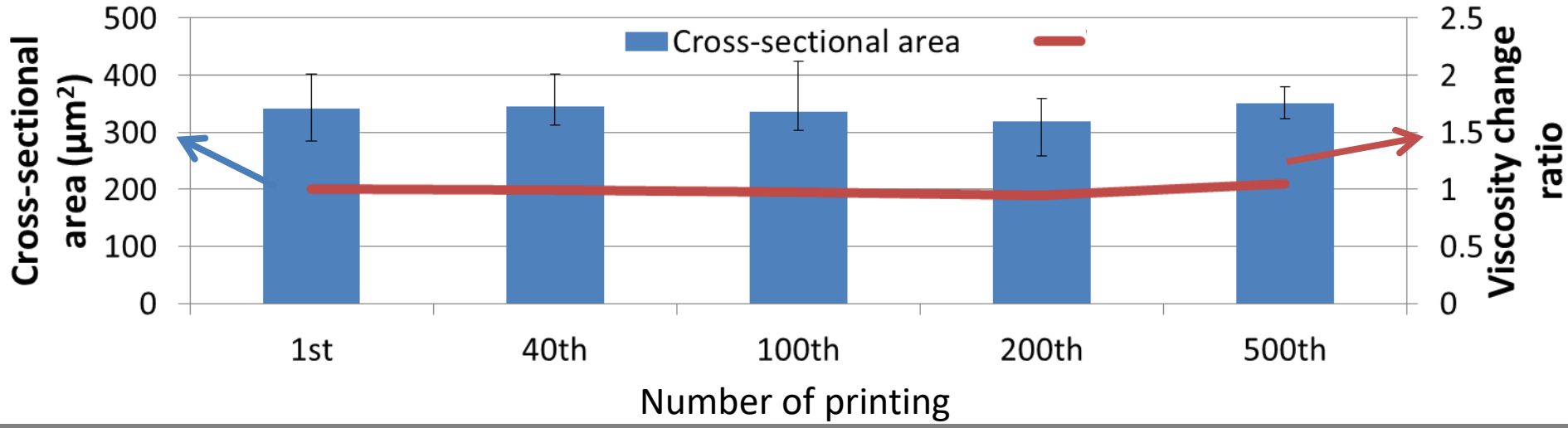
No significant changes of line profile, cross-sectional area and ink viscosity were observed, while 500 printing operations were performed. (Screen size: 15cm x 15cm)

◆Line profile (20 lines of overlap)

X-axis : mm, Y-axis : µm



◆Cross-sectional area (calculated from the line profile)



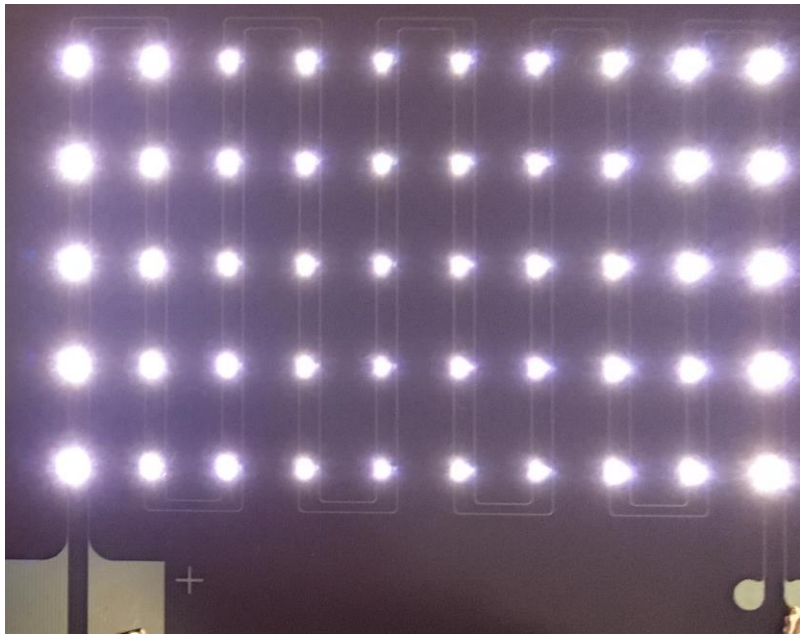
Example of printing sample

We examined the function of wiring between printed by our ink and curable silver paste.

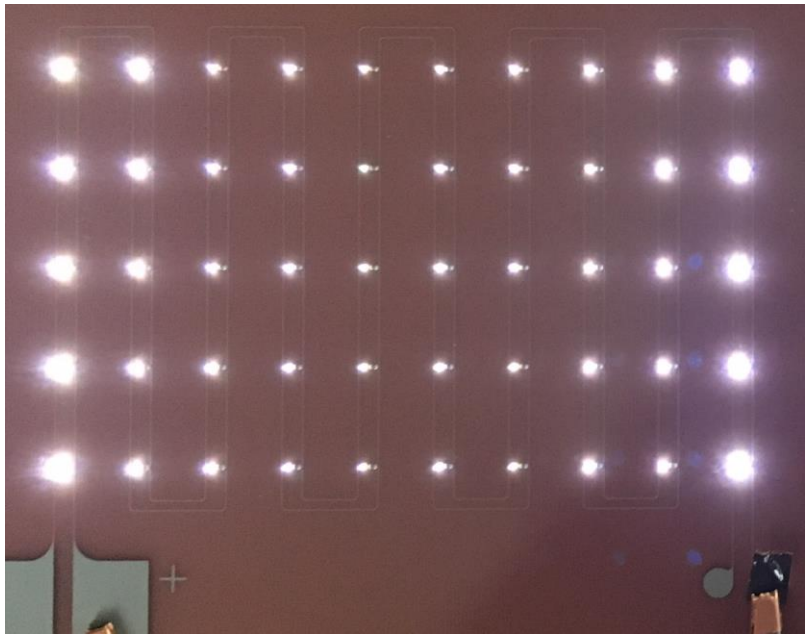
【Ink】
①Picosil for screen printing
②Curable silver paste

【Printing method/Sintering condition】
Wiring was formed by screen printing in same condition
Sintering temperature was 120 degree C

①Picosil for screen printing



②Curable silver paste



Wiring formed by “Picosil” has low resistivity, so LED emit more shine.
(not disturbed by wiring resistance)