



METALLO ORGANIC PASTE

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Metalor Technologies(Japan) Corporation

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1. METALLO ORGANIC PASTE

Feature:

1. Good smoothness thin film can be formed to have uniformity components dispersion in comparison with thick type conductor paste.
2. Support for pattern formation other than screen printing
(Fine pattern can be formed by photo etching etc.)
3. Good productivity (No special equipment such as evaporation method is required.
(Submicron coating can be obtained by the same method as normal thick film paste)

Fig.1 M.O Au Paste film

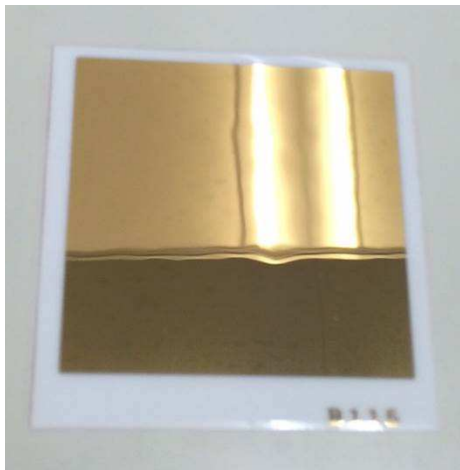
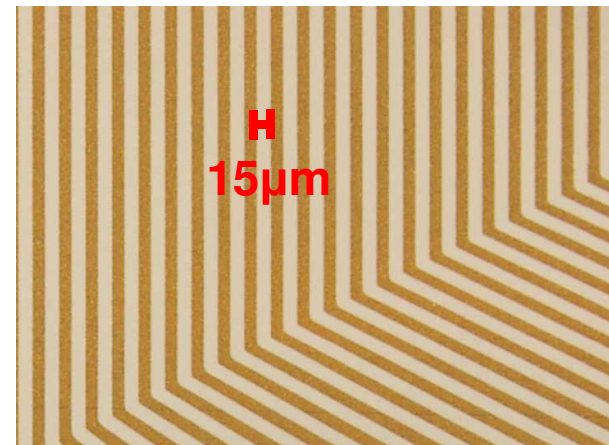


Fig.2 Chemical Etching (Fine line formation)



L/S=15/15 μ m

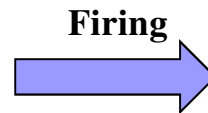
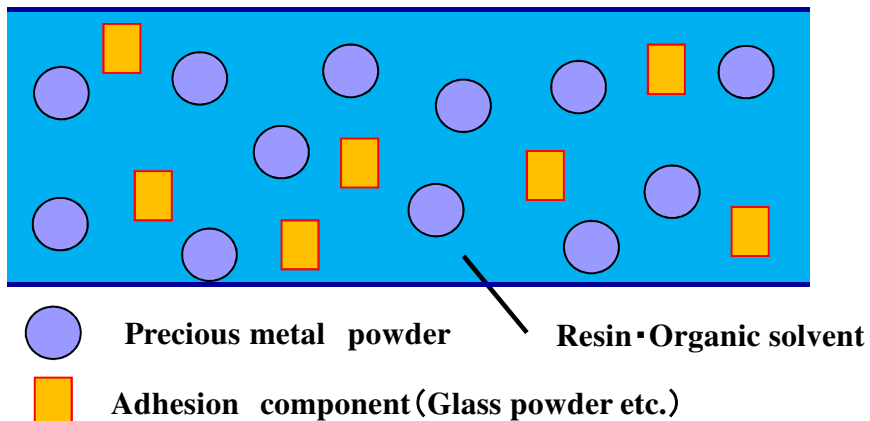
2. Film formation by METALLO ORGANIC PASTE

Metallo organic paste does not contain powder as compared general thick paste. All ingredients are composed of resinate (organometallic compound). Each resinate in metallo organic paste is present in a state dissolved in an organic solvent together with the resin component. By firing this, the resin and organic components of the resinate are decomposed / burned off, and remaining component deposit as a film. Since it does not contain solid (powder) in its components, it can be mixed homogeneously with any components.

<Difference between Metallo organic paste and Conductor paste for thick film>

Conductor paste for thick film

Thickness : 10~25 μ m



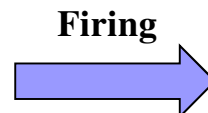
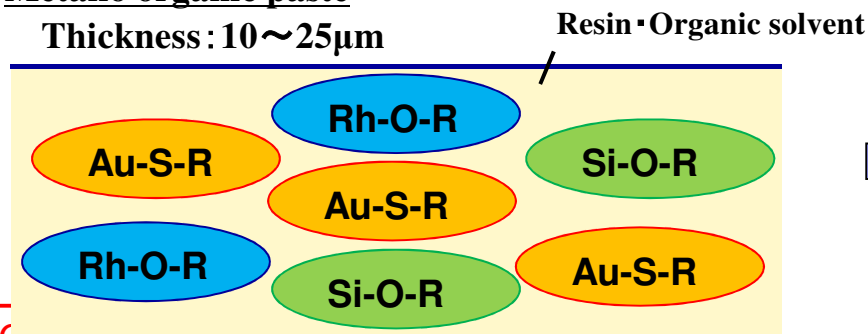
Thickness : 5~20 μ m



Poor surface smoothness
Many voids

Metallo organic paste

Thickness : 10~25 μ m



Thickness : 0.1~1.5 μ m

Au Pb Au Au Si Au Au Au Bi

Good surface smoothness
Good dispersion
Less voids

3. METALLO ORGANIC PASTE PRODUCTS

Main products shows as below. We can customize by requirement.

Conductive Metal	Au	Au	Au	Au	Au	Au	Ag	Pt
Name	A-4615	E-9802T	E-9802	E-9832	E-1807	H98C-1E	E-3628	E-3100
Metal content	Au : 18%	Au : 20%	Au : 20%	Au : 20%	Au : 18%	Au : 24%	Ag : 28.3%	Pt : 10%
Coating method	Screen print	Screen print	Screen print	Screen print	Screen print	Screen print	Screen print	Screen print
Substrate	Glazed alumina	Glazed alumina	Glazed alumina	Glazed alumina	Glazed alumina	Glazed alumina	Glazed alumina glass	Glazed alumina
Dry temp. (°C)	125	80	80	80	125	80	125	80
Firing temp. (°C)	750~850						600~850	750~850
Thickness after firing (μm)	0.3	0.5	0.5	0.5	0.3	0.6	1.0	0.1
Surface resistivity (mΩ/□)	≤300	≤300	≤300	≤300	≤300	≤300	≤50	≤2,000
Viscosity (Pa·s)	30~70	80~120	80~120	80~120	30~70	30~70	65~105	30~70
Specific gravity (g/cm³)	1.15	1.20	1.20	1.20	1.15	1.25	1.25	1.05
Feature	High surface smoothness (Pb)	(Pb free)	Good patterning vs E-9802T	Good adhesion vs E-9802	Strong W/B (Pb free)	High thickness formation vs E-1807	(Pb free)	(Pb free)

※Value of thickness after firing and surface resistivity show by use of SUS: 325 mesh screen.

These value is depend on screen mesh size and other printing conditions.

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4. About fired test pieces

- **Product : M.O. Au PASTE A-4615**

- **Substrate : Glazed alumina from CCTC**

- **Sample**

- Condition-1 : Single layer (Coating→Dry→Firing) 2pieces**

- Condition-2 : Double layer (Coating→Dry→Firing→Coating→Dry→Firing) 2pieces**

- **Formation method**

- Coating : 325mesh screen**

- Dry : 125°C-10min**

- Firing : peak temperature 805-810°C keeping, 60min cycle**

- **Others**

- Due to mis-setting of the printing machine, thickness of single layer become even thicker, which is not the best condition.**



M.O. GOLD PASTE A-4615

- Product name : METALLO ORGANIC GOLD PASTE A-4615
- Au content : 18%
- Coating methode : Screen printing
- Substrate material : Glazed alumina
- Drying temperature : 125°C
- Firing temperature : 750-850°C
- Thickness after firing* : 0.3um
- Surface resistivity* : $\leq 300\text{m}\Omega/\square$
- Viscosity : 30-70Pa·s
- Paste specific gravity : 1.15g/cm³

* Both thickness after firing and surface resistivity is at 325mesh screen (SUS).

This value is different by mesh size.



Operation Manual of M.O. GOLD PASTE A-4615

➤ Storage

■ Un-opened package

Store in a cool and dark place not exposed to direct sunlight at 5-20°C.

It is important to suppress deterioration due to solvent volatilization and moisture contamination.

If stored below 15°C, keep it to room temperature above 15min before opening. Because to prevent moisture contamination due to dew condensation. For humidity, we recommend to keep it in a lower humidity condition (humidity: 60% or less) to avoid moisture contamination.

■ Opened package

Please basically store opened package under the same conditions as un-opened package.



Operation Manual of M.O. GOLD PASTE A-4615

➤ Valid term

The valid term of A-4615 is set to 6 months after manufacturing, if it is kept in an unopened state under proper environment. After opened, there is no guarantee because of possibility deterioration due to external factors. And viscosity is excluded from guarantee items because of increase over time.

When the viscosity rises, please use add dilution solvent and adjust to the appropriate range.



Operation Manual of M.O. GOLD PASTE A-4615

➤ Process

- ① Coating method : Screen printing
- ② Leveling : Leave at room temperature for 5 to 10 minutes
- ③ Drying : Approximately 10 minutes at 125 °C
- ④ Firing : Keep for 5 to 10 minutes at 805 to 810 °C by 60 minutes cycle
 - 1) Almost linearly rising from room temperature to 805 to 810 °C in about 25 minutes
 - 2) Keep at 805 to 810 °C. for 5 to 10 minutes
 - 3) Almost linearly decreasing from 805 to 810 °C to room temperature in about 25 minutes

About firing process

1) Firing temperature

If the firing temperature is low, film characteristics may be adversely affected, such as poor adhesion or poor surface smoothness etc., so please fire at 700 °C or more, preferably 750 °C or more.



Operation Manual of M.O. GOLD PASTE A-4615

➤ Process

2) Firing cycle time

If the heating rate is fast, desolvent does not proceed properly, there is a possibility that film formation may be adversely affected such as generation of cracks and pinholes. So please proceed about 30 minutes up to the firing peak temperature and about 60 minutes cycle.

In the 30-minute cycle firing (rapid temperature cycle), it is observed obviously poor surface smoothness due to poor film formation, so please fire at a minimum of 45 minutes or more in cycle time. Long cycle time have minimum influence.



Operation Manual of M.O. GOLD PASTE A-4615

- Process

- 3) Others

M.O. Paste contains many organic substances as compared with general thick film paste, and it needs a lot of oxygen for decomposition / disappearance of organic components at firing.

If oxygen is insufficient, organic components / ash residue in the film may occur, and may affect the film formation. Therefore, please allow enough air supply.



Operation Manual of M.O. GOLD PASTE A-4615

➤ Dilution

We recommend the use of our product "THINNER A - 4182" as a dilution solvent, and supply at mass production is also possible.

If the sample is about 100 g, you can obtain the necessary uniformity by stirring thoroughly in a container (spending more than 1 minute) using a spatula or the like. As a more reliable method, it is recommended to use a rotating / revolving mixer which stirs in a container as it is.

Dilution have two main purpose.

1) Adjust to optimum printing viscosity by reduced viscosity.

For example adjust the viscosity to 10-15Pa·s.

2) Adjust the thickness to be formed by reduced gold content. Or adjust the surface resistivity by reduced gold content.

For example adjust the gold content to 15-17%.

(Original gold content is 18%.)



Operation Manual of M.O. GOLD PASTE A-4615

➤ Dilution

Normally dilution ratio is around 10%.

1g of THINNER A-4182 for 10g Au paste

Maximum dilution ratio is 15%.

1.5g of THINNER A-4182 for 10g Au paste

For example viscosity shows when THINNER A-4182 is used as dilution.

42.0Pa·s of A-4615 is 10% diluted by A-4182.

Viscosity become 12.3Pa·s.

And surface resistivity become as follows.

Before dilution : 125mΩ/□

After dilution : 148mΩ/□ (around 18% Up)

So thickness shows around 15% low.



M.O. GOLD PASTE H98C-1E

- Product name : METALLO ORGANIC GOLD PASTE H-98C-1E
- Au content : 24%
- Coating methode : Screen printing
- Substrate material : Glazed alumina
- Drying temperature : 80°C
- Firing temperature : 750-850°C
- Thickness after firing* : 0.6um
- Surface resistivity* : $\leq 300\text{m}\Omega/\square$
- Viscosity : 30-70Pa·s
- Paste specific gravity : 1.25g/cm³

* Both thickness after firing and surface resistivity is at 325mesh screen (SUS).

This value is different by mesh size.