



Making Transparent Conductive Films

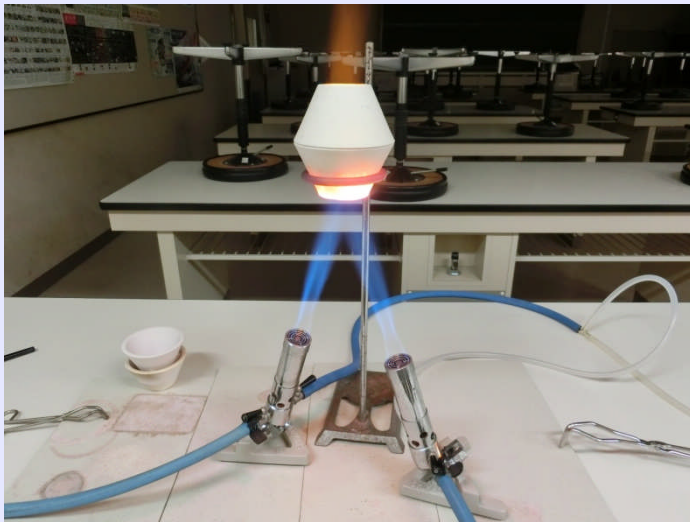


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So far thing

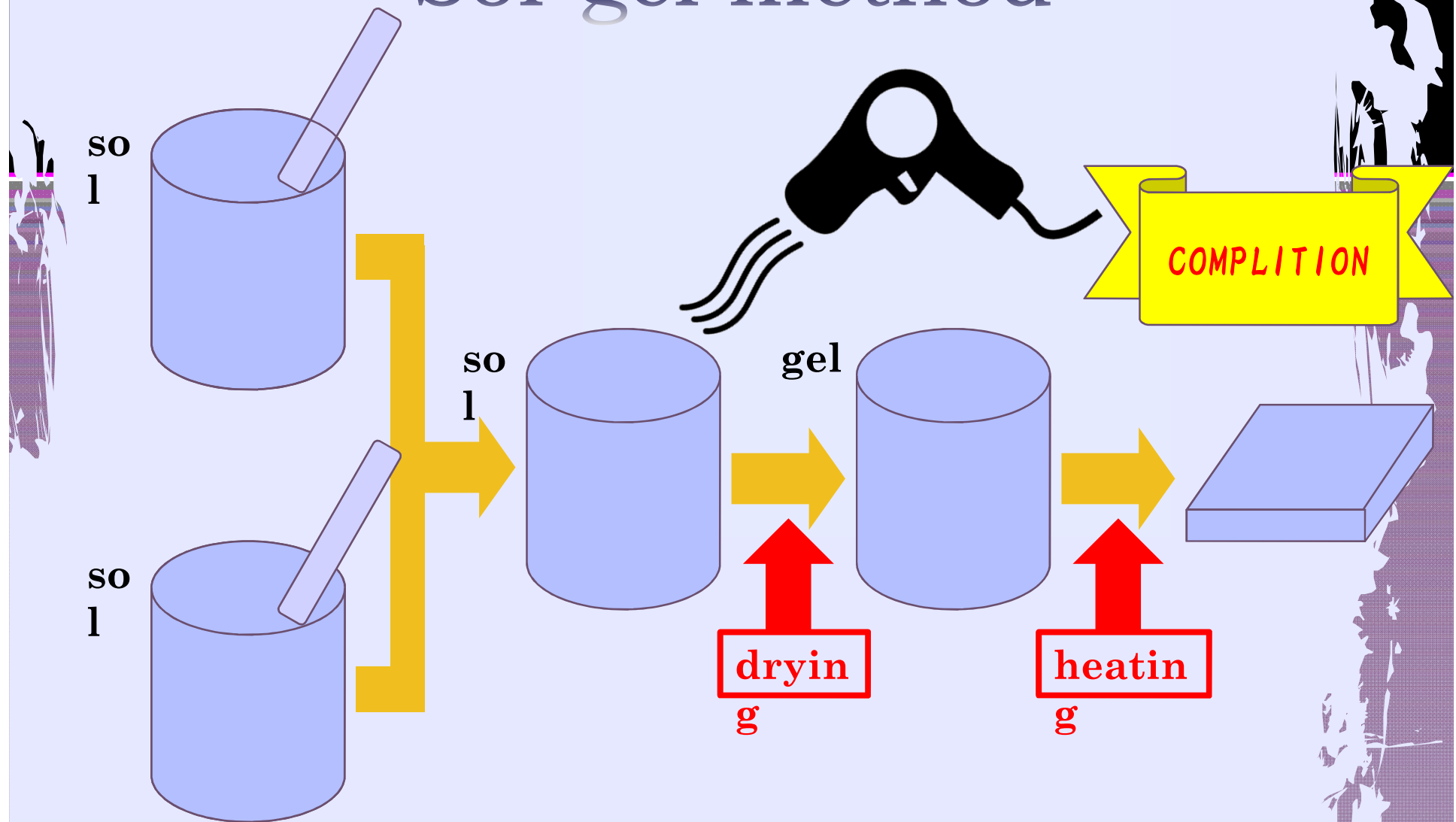
- ◆ We tried to make transparent conductive films by mixing metal powder and heating them last year.



Motivation

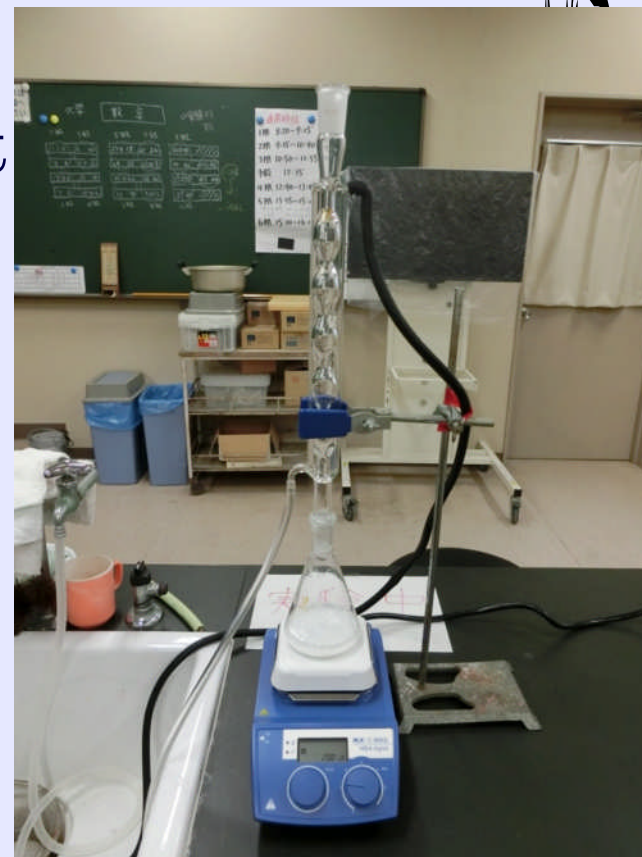
- ◆ We conducted experiments aimed at making them by sol-gel method.
- ◆ We thought sol-gel method can make transparent conductive films more effectively than previous way.

Sol-gel method



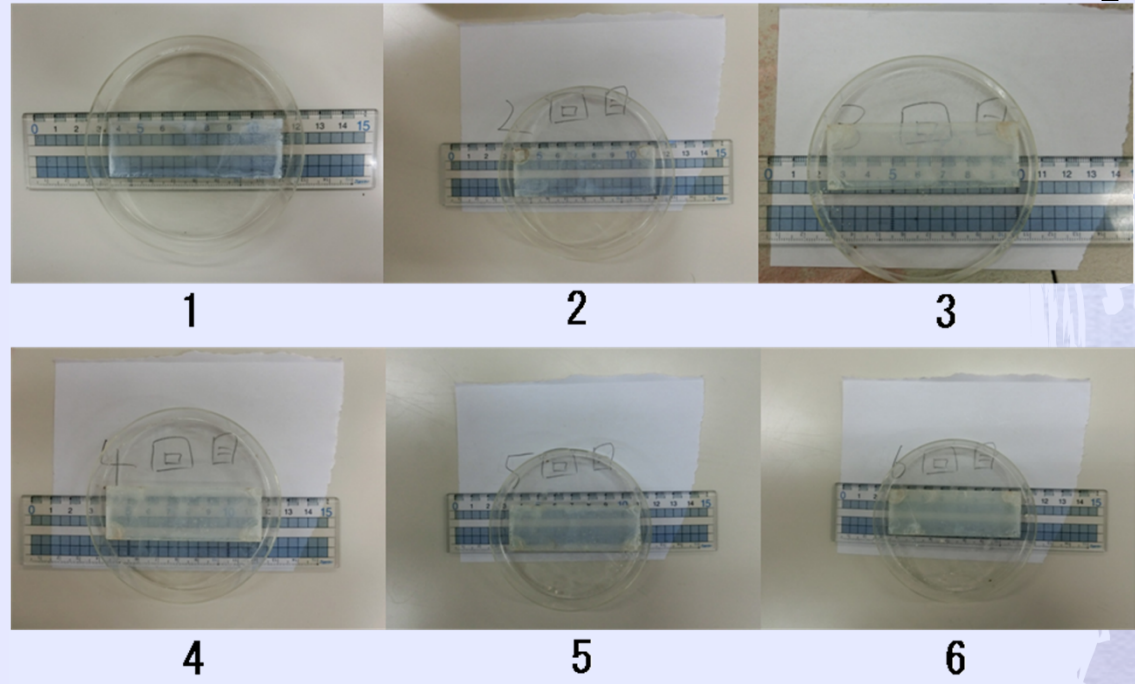
Experiment's method I

- ① Dissolve zinc acetate dihydrate in 2-methoxyethanol and reflux at 200°C .
- ② Dissolve aluminum isopropoxide in ethanol and mix into ①.
- ③ Coat a slide glass in ② and dry it at 300°C .
- ④ Repeat process of ③ until it conduct electricity.
- ⑤ Heat ④ at 800°C .



Result I

Count of coating	Electric resistance
1st	※
2nd	※
3rd	※
4th	$3 \times 10\text{M}\Omega$
5th	$2 \times 10\text{M}\Omega$
6th	$1 \times 10\text{M}\Omega$
Main firing	※



※・・・ We cannot measure the value.

- ◆ In making the sol ,precipitation occurred.
- ◆ The slide glass bent and couldn't conduct electricity .

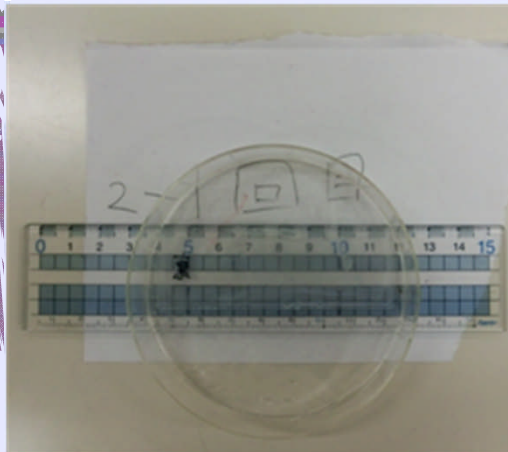
Consideration I

- ◆ Transmittance is not good because sol got muddy in process② .
- ◆ It became not conducting electricity because it bended .

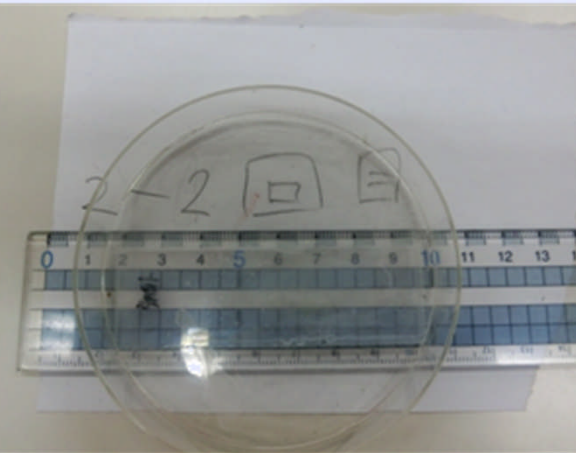
Experiment's method II

- ① Filter the sol used in experiment I .
- ② Coat the slide glass with ① and dry it.
- ③ Repeat process of ② until it gets conductive.
- ④ Heat ③ in high temperature.

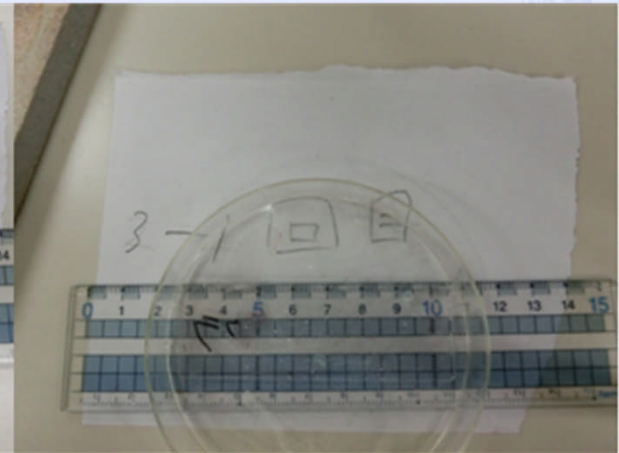
Result II



2-1



2-2



3-1

- ◆ The transmittance was improved.

Experiment's method III

- ① Reduce the amount of zinc acetate in 2-methoxyethanol in half and heat the solution at 220°C for 8 hours 5 minutes.
- ② Coat slide glass with ① and dry it.
- ③ Repeat process of ② until it gets conductive.
- ④ Heat ③ at 120°C for 45 minutes.

Consideration III

- ◆ There was no change in the sol immediately after heating.
- ◆ Leave the petri dish as it was, the sol changing gel partly.
- ◆ We are observing the petri dish now.
- ◆ We expect that it will become transparent conductive film.