



Preparation of ink for electrode deposition via paint brushing using oxide powders V.2

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Works for me

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SOFC Procedures

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ABSTRACT

A simple and efficient procedure to produce a viscous ink for brush painting of porous electrodes on top of electrolyte pellets for Solid Oxide Fuel Cells (SOFCs).

The layers have a variable porosity between 20 and 40%, depending on the choice of the calcination parameters, which strongly depends on the electrode and electrolyte materials, the particle size distribution and the morphology of both the powders.

The thickness of the layers is variable in the 10-100 μm range, depending upon the amount of ink deposited. All the calcination parameters, the electrode and electrolyte materials, the particle size distribution and the morphology influence the adhesion of the electrode layer on the electrolyte substrate.

ATTACHMENTS

[Know-How_P01_preparation-of-ink.pdf](#)

PROTOCOL CITATION

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KEYWORDS

Electrode, Paint brushing, Viscous paste, Ink, SOFC, Solid Oxide, Terpeneol

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1. Preparation of organic viscous paste

3h

- 1 Weigh terpeneol directly inside the bottle



Glass bottle with plastic lid and magnetic stir bar inside for paste preparation

A	B	C	D
Compounds	CAS Number	Percentage [wt./wt.]	Amount [g]
Ethyl-cellulose	9004-57-3	4%	0.0800
Terpineol	95-55-5	76%	1.5200
Iso-propanol	67-63-0	20%	0.4000

Massive ratio of compounds for the paste production

- 1.1 Add iso-propanol
- 1.2 Close the lid and stir few minutes on a magnetic plate
- 1.3 Weigh ethyl-cellulose separately on tin foil
- 1.4 Add the ethyl-cellulose little by little to avoid big agglomerations
Be careful to limit the solid on the walls and on the top of the stirrer
- 1.5 Close the lid and stir until complete dissolution and homogenization
Be careful that there are no clumps on the walls

2. Treatment of the raw powder for ink preparation

5h

- 2 The oxide powder ideally will be treated previously to ink preparation to avoid the presence big agglomerates
 - 2.1 Ball milling at 300 rpm / 4h with balls/powder mass ratio of 10 to 20 with ethanol as media (covering powder), with zirconia or WC jar/balls
 - 2.2 After recovering the powder with ethanol, it is dried in a muffle (80°C)

- 3 Clean and weigh a plastic bottle with cone-shaped bottom



Plastic bottle used to prepare inks

- 4 Weigh about 0.1 g of viscous paste with a thin metal tip (Figure Step 1)
- 5 Calculate the amount of electrode powders to add (ratio 3:2 in weight)
- 6 Weigh, add the electrode powders and mix with the metal tip to perfectly homogenize the ink
Be careful to completely incorporate all the powders
- 7 Rest for sedimentation at least 15 minutes
- 8 Dip the brush only in the top part of the ink and paint the electrolyte surface as more homogeneous as possible
- 9 Dry at 150 °C for 3 hours and paint the other side
- 10 Calcine at 1000 °C for 2 hours (± 1 °C/min) and check the adhesion!