Understanding and minimizing anode degradation in hydrogen and natural gas fuelled SOFCs

ROBANODE PROJECT

Instituto de Cerámica y Vidrio (CSIC), Madrid (Spain)

Personal implicado:

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Lista de participantes	
Nombre de la organización	País
Foundation for Research and Technology Hellas-Institute of Chemical Engineering & High Temperature Chemical Processes (ICE-HT)	Grecia (Coordinadores)
Technische Univestitaet Clausthal (TUC)	Alemania
National Technical Univestity of Athens (NTUA)	Grecia
Ecole Polytechnique Federale de Lusanne (EPFL)	Suiza
Consejo Superior de Investigaciones Científicas (CSIC)	España
Centre National de la Recherche Scientifique (CNRS)	Francia
Anonymi Etaireia Technologikis Anaptyxis Keramikon Kai Pyrimachon (CERECO)	Grecia
Saint-Gobain CREE	Francia

Participant number in this project	Participant short name	Estimated Eligible Costs (Whole duration of the project)					Total Receipts	Requested FCH JU Contribution	Maximum Pre-financing (80%)
		RTD/ Innovation (A)	Demo (B)	Management (C)	Other (D)	Total (A+B+C+D)			
5	CSIC	352,320.00	0.00	6,000.00	0.00	358,320.00	0.00	210,020.00	168,016.00
TOTAL		**3,327,938.00**	**0.00**	**66,950.00**		**3,394,888.00**	**0.00**	**1,568,530.00**	**1,254,824.00**

Work Package 2. Material preparation

Leader ICV-CSIC

Partners Involved: Saint Gobain, TUC, CERECO, CSIC, NTUA, ICE-HT

30/166 person months. Duration 36 months

Tasks

Tasks 2.1.- Preparation of anode powders with defined particle size distribution. Output (Powders for the preparation of the anodes to be tested in WP3 ans WP4).

Task 2.2.- Preparation for of modified anode powders (Output: modified anode powders for study of the degradationdue to sulfur poisoning).

Deliverables similar to the output.

Milestones:

M2.1.- Sucess in preparation of modified anode powders.
M2.2.- Sucess in preparation of Half Cells

Work Package 3. Characterization of the prepared material
Leader: NTUA
Partners Involved: Saint Gobain,TUC,CERECO,CSIC,NTUA, ICE-HT, EPFL, CNRS
18/96 person months. Duration 30 months

Tasks

Tasks 3.1.- Determination of structure and morphology of anode powders and modifiers. Output (Information about interations between the fuel components and the constituents of the anode. This information will be used to model the anode degradation steps and to propose actions to avoid it).

Deliverables similar to the output.

COMBUSTION SYNTHESIS

Initial mixture

Precursors

Homogeneous mixture

Final product

Parameters that can be controlled:

-Oxidizing/Reducing combustion environment

-Temperature

Precursors/Fuel Ratio

Raw materials

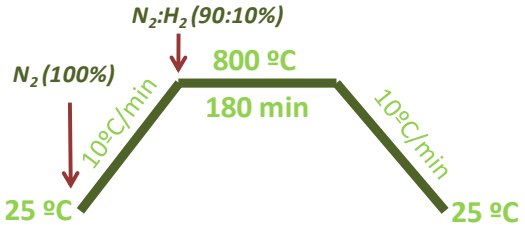
- **NiO/CGO Nanostructured powders**: 65%(NiO)-35%($Ce_{0.9}Gd_{0.1}O_2$)
- **Precursors**: Nitrates/stoichiometric Urea as fuel.
- **4 different batches**: high reproducibility

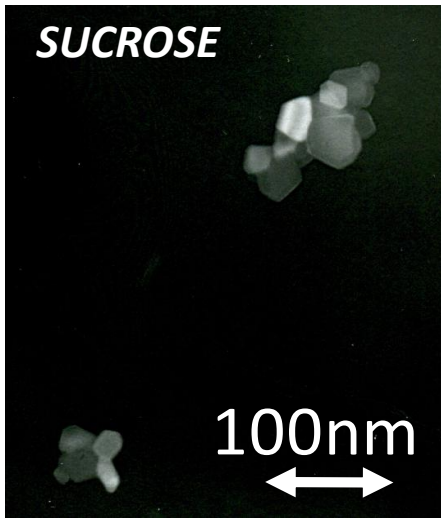
RESULTADOS

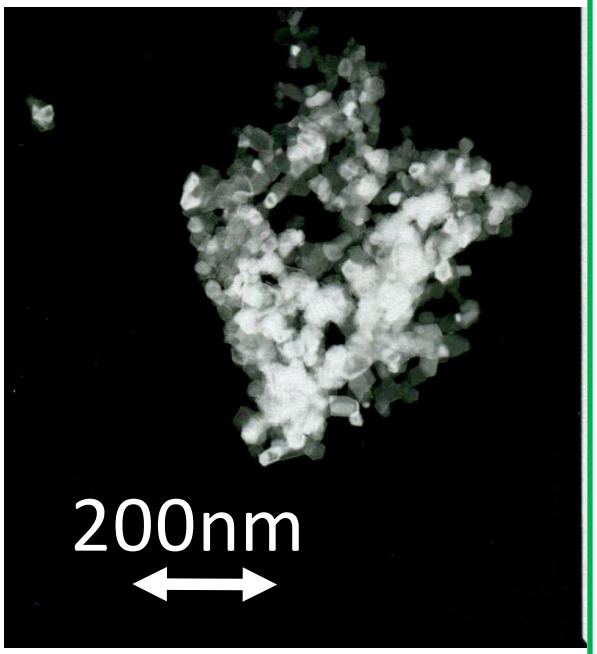
65%(NiO)-35%(GDC) reduced powders

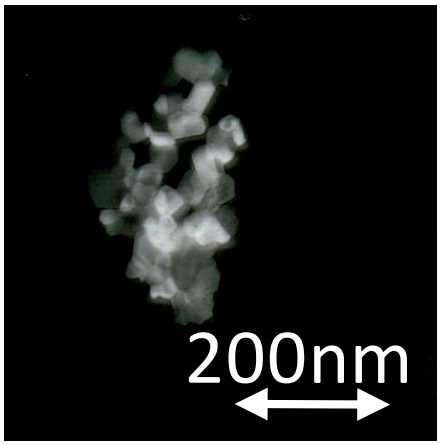
-Samples were first measured in air
-Then the TT in N_2:H_2 was carried out

Ni raw material = $Ni(Acac)_2$





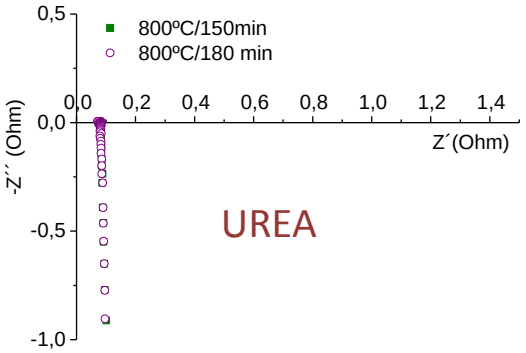


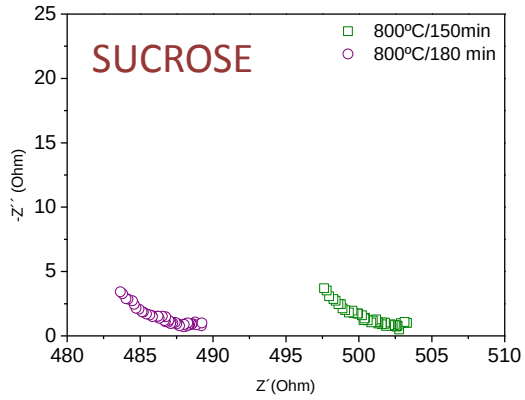


✓ *Particle size remained 20-40 nm*

✓ *Resistance increases in the case of sucrose*

EIS, in N_2:H_2





Gracias por su atención