

DAVIDE CADEMARTORI

PRESENTATION

Since my master's I have developed a strong interest in electrochemistry and materials science, which drove my decision of carrying out a PhD and postdoc focused on solid oxide cells. My international study experiences shaped me into an adaptable and open-minded person, ready to take on new challenges for my career in research.

ORCID profile: <https://orcid.org/0000-0002-1481-983X>

ACQUIRED SKILLS

- Electrochemical and microstructural modelling of electrochemical systems
- Electrochemical Impedance Spectroscopy techniques
- SOCs fabrication by tape casting, freeze tape casting, infiltration, air brushing

LANGUAGE SKILLS

- Italian: Native
- English: C1 level
- French: B1 level

SOFTWARE SKILLS

- Office, Matlab, Comsol, Python, Zview, Origin: Intermediate/Advanced

CURRENTLY

Postdoctoral Researcher at CEA-LITEN (Grenoble, France)

March 2024 – March 2026

Focus on: microstructural and physics-based modelling of solid oxide cells

Active participation to the research activities of European (**NOAH₂** -novel SOE architectures for hydrogen production) and French (**CELCER-EHT** from the National Research Agency) projects. Co-tutorship of PhD students working on novel electrode materials and infiltrated microstructures for solid oxide cells

EDUCATION

PhD Course in Chemical, Materials and Process Engineering

DICCA, University of Genoa (Italy)

November 2020 – February 2024

Final grade: **Excellent CUM LAUDE**

Focus on: manufacturing of 8YSZ and GDC10 scaffolds for solid oxide cells by freeze tape casting, electrocatalyst infiltration, synthesis and characterization of $La_{0.7}Sr_{0.3}Cu_{0.15}Fe_{0.85}O_{3-\delta}$, testing of symmetrical and complete button cells by Electrochemical Impedance Spectroscopy (EIS), Distribution of Relaxation Times (DRT) analysis and Equivalent Circuit (EC) modelling, microstructural and electrochemical modelling of infiltrated electrodes.

Thesis title: "Microstructural engineering of electrodes for solid oxide cells via infiltration and freeze tape casting". Supervisor: Prof. Maria Paola Carpanese, University of Genoa.

Master's Degree in Chemical and Process Engineering

Polytechnic School, University of Genoa (Italy)

September 2017 – March 2020

Final grade: **110/110 CUM LAUDE**

Focus on: chemical plants, multiscale analysis and simulation of chemical processes, chemical reactors and applied kinetics, electrochemical materials and technologies, industrial biotechnologies, ceramic materials, local transport phenomena.

Thesis title: "Fabrication and electrochemical testing of button solid oxide cells". Supervisors: Prof. Robert Steinberger-Wilckens, Prof. Maria Paola Carpanese, Dr. Ahmad El-Kharouf. Universities of Genoa and Birmingham.

Bachelor's Degree in Chemical Engineering

Polytechnic School, University of Genoa (Italy)

September 2014 – July 2017

Final grade: **110/110 CUM LAUDE**

Focus on: chemical processes and plants, electrochemistry, fluid mechanic, corrosion and protection of materials, transport phenomena, materials science, general metallurgy.

Thesis title: "Electrochemical and structural characterisation of a composite electrolyte based on doped ceria (GDC) and LSGM for fuel cells at intermediate temperatures". Supervisors: Prof. Maria Paola Carpanese, Prof. Rodolfo Botter. University of Genoa.

Classical High School Diploma

Liceo Classico Federico Delpino, Chiavari (Italy)

September 2009 – June 2014

Final Grade: **100/100**

ABROAD EXPERIENCES AND COLLABORATIONS

PhD Collaboration: Commisariat à l'Energie Atomique (CEA), Grenoble (Fr)
January 2023 - August 2023
Construction of a tailored electrochemical model for graded porous electrodes. Electrochemical testing of innovative fuel electrodes for Solid Oxide Cells.

PhD Collaboration: ISTECH CNR, Faenza (It)

November 2021– December 2021 and May 2022 – June 2022
Manufacturing of graded porous electrodes for Solid Oxide Cells by the freeze tape casting technique.

Master's thesis with Erasmus+ for Traineeship: Centre for Hydrogen and Fuel Cell Research

University of Birmingham (UK)

September 2019 – February 2020

Experimental activity on manufacturing and electrochemical analysis of reversible button solid oxide cells. Team and independent work.

RESEARCH SCHOLARSHIPS

I have been the recipient of two research scholarships issued by the department of Civil, Chemical and Environmental Engineering (DICCA) of the University of Genoa:

- **“Contributo alla fabbricazione e caratterizzazione elettrochimica di un microstack a ossidi solidi a struttura innovativa per elettrolisi da acqua di mare”**, December 2023 – February 2024
Supervisor: Prof. Maria Paola Carpanese
- **“Fabrication and electrochemical characterisation of solid oxide co-electrolysis cell components”**, September 2020 – October 2020
Supervisor: Prof. Maria Paola Carpanese
- **“Preliminary investigations on perovskite electrodes as candidates for the development of the COELUS project”**, June 2020 – July 2020
Supervisor: Prof. Maria Paola Carpanese

AWARDS AND OTHER ACTIVITIES

- Award **“Fondazione Oronzio e Niccolò De Nora”** for the best PhD thesis in electrochemistry, from the Electrochemistry Division of the Italian Society of Chemistry (SCI), 2024.
- Award **“Galileo Galilei – Young Researcher”** from Rotary International Club, 2022.
- **NOWTILUS – SEA INNOVATION HUB**: business training from the incubator Wylab for the spin-off H₂ELM after contest and selection from Nowtilus stakeholders. Presentation of business plan to the investors. May-Dec 2021.
- Award **“Roberta Miglio”** for the best master's thesis on materials from INSTM, 2021.
- Five scholarships from **“Fondazione Arvedi Buschini”**, 2015 – 2019.
- **Guest Editor** of the special issue **“Surface Engineering of Solid-State Electrochemical Systems for Energy Conversion and Storage” – Coatings (MDPI)**, 2025.

TEACHING AND TUTORSHIP

- **Co-lecturer** of the PhD course **“Electrochemical Energy: advanced materials and technologies”**, University of Genoa, PhD curriculum of **“Ingegneria Chimica, dei Materiali e di Processo”**, academic year 2024-2025.

- **Co-lecturer** of the bachelor's course "Fondamenti Chimici delle Tecnologie", University of Genoa, academic year 2023-2024.
- **Teaching assistance** for the master's course of "Ceramic Materials", University of Genoa, academic year 2024-2025, 10 hours.
- **Teaching assistance** for the bachelor's course of "Fondamenti Chimici delle Tecnologie", University of Genoa, academic year 2024-2025, 10 hours.
- **Teaching assistance** for the master's course of "Ceramic Materials", University of Genoa, academic year 2023-2024, 5 hours.
- **Teaching assistance** for the bachelor's course of "Chemistry", University of Genoa, academic year 2021-2022, 6 hours.
- **Co-supervisor** of one Master's thesis for the SERP+ project, University of Genoa, 2023.
- **Co-supervisor** of two Bachelor's theses at the DICCA department of the University of Genoa, 2023.

PUBLICATIONS IN JOURNALS WITH IMPACT FACTOR

D. Cademartori, **Unveiling the characteristic EIS fingerprint of the ion-transfer process in air electrodes for solid oxide cells**, Journal of Electroanalytical Chemistry 984 (2025) 119026.
<https://doi.org/https://doi.org/10.1016/j.jelechem.2025.119026>.

Á. Triviño-Peláez, D. Cademartori, M. Hubert, L. Rorato, M. Prioux, J. Laurencin, **Modelling the impact of Ni migration and coarsening on the Ni-YSZ electrodes performances based on three-dimensional microstructures**, Electrochimica Acta 520 (2025) 145791.
<https://doi.org/https://doi.org/10.1016/j.electacta.2025.145791>.

D. Cademartori, M. Hubert, E. Bonnet, J.M. Bassat, J. Laurencin, **Engineering nanostructured electrodes for solid oxide cells (SOCs) via microstructural and electrochemical modelling**, International Journal of Hydrogen Energy 98 (2025) 1396-1414.
<https://doi.org/https://doi.org/10.1016/j.ijhydene.2024.11.484>.

D. Cademartori, A.M. Asensio, D. Clematis, M. Hubert, J. Laurencin, A. Barbucci, **Elucidating the impact of gas transport on high-performing air electrodes: a 1D physically based model unveiling the correlation between microstructure and impedance response**, Journal of Physics: Energy 7(1) (2025) 015005.
<https://doi.org/10.1088/2515-7655/ad9cbf>.

J.F. Basbus, D. Cademartori, A.M. Asensio, D. Clematis, L. Savio, M. Pani, E. Gallus, M.P. Carpanese, A. Barbucci, S. Presto, M. Viviani, **Study of a novel microstructured air electrode/electrolyte interface for solid oxide cells**, Applied Surface Science 652 (2024) 159372.
<https://doi.org/https://doi.org/10.1016/j.apsusc.2024.159372>.

D. Cademartori, D. Clematis, M.P. Carpanese, **Microstructural and electrochemical properties of Ni-impregnated GDC10 and 8YSZ freeze tape cast scaffolds as fuel electrodes for solid oxide cells**, International Journal of Hydrogen Energy 50 (2024) 1050-1063.
<https://doi.org/https://doi.org/10.1016/j.ijhydene.2023.10.027>.

D. Cademartori, M. Hubert, P. Cloetens, M.P. Carpanese, J. Laurencin, **The design optimization of nanostructured hierarchical electrodes for solid oxide cells by artificial impregnation**, Materials & Design 238 (2024) 112663.
<https://doi.org/https://doi.org/10.1016/j.matdes.2024.112663>.

T. Vairo, D. Cademartori, M.P. Carpanese, D. Clematis, A. Barbucci, B. Fabiano, **Fuel Cells for Shipping. An Approach towards Dynamic Safety Assessment**, Chemical Engineering Transactions 90 (2022) 331-336. <https://doi.org/10.3303/CET2290056>.

J. Abidi, D. Clematis, Y. Samet, M. Delucchi, D. Cademartori, M. Panizza, **Influence of anode material and chlorides in the new-gen solid polymer electrolyte cell for electrochemical oxidation – Optimization of Chloroxylenol degradation with response surface methodology**, Journal of Electroanalytical Chemistry 920 (2022) 116584. <https://doi.org/10.1016/j.jelechem.2022.116584>.

D. Cademartori, D. Clematis, M.P. Carpanese, **Microstructural and electrochemical properties of Ni-impregnated GDC10 and 8YSZ freeze tape cast scaffolds as fuel electrodes for solid oxide cells**, International Journal of Hydrogen Energy 50 (2023) 1050-1063. <https://doi.org/10.1016/j.ijhydene.2023.10.027>.

D. Clematis, E. Skolotneva, D. Cademartori, M. Panizza, **Impact of catalyst, chelating agent and light irradiation on electro-Fenton performance under not optimal conditions**, Chemosphere 344 (2023). <https://doi.org/10.1016/j.chemosphere.2023.140408>.

D. Cademartori, A. Maria Asensio, D. Clematis, J.F. Basbus, M. Viviani, S. Presto, A. Barbucci, M.P. Carpanese, **A high-performance Co-free electrode for solid oxide cells: $\text{La}_{0.5}\text{Sr}_{0.3}\text{Cu}_{0.15}\text{Fe}_{0.85}\text{O}_{3-\delta}$ synthesis and characterisation**, Journal of Alloys and Compounds 965 (2023) 171334. <https://doi.org/https://doi.org/10.1016/j.jallcom.2023.171334>.

X. Majnoni d'Intignano, D. Cademartori, D. Clematis, S. Presto, M. Viviani, R. Botter, A. Barbucci, G. Cerisola, G. Caboche, M.P. Carpanese, **Infiltrated $\text{Ba}_{0.5}\text{Sr}_{0.5}\text{Co}_{0.8}\text{Fe}_{0.2}\text{O}_{3-\delta}$ -Based Electrodes as Anodes in Solid Oxide Electrolysis Cells**, Energies 13(14) (2020) 3659. <https://doi.org/10.3390/en13143659>.

A.M. Asensio, D. Clematis, M. Viviani, M.P. Carpanese, S. Presto, D. Cademartori, P.L. Cabot, A. Barbucci, **Impregnation of microporous SDC scaffold as stable solid oxide cell BSCF-based air electrode**, Energy 237 (2021) 121514. <https://doi.org/https://doi.org/10.1016/j.energy.2021.121514>.

A.M. Asensio, D. Clematis, D. Cademartori, M.P. Carpanese, M. Viviani, C. Carbone, A. Barbucci, **Calcium doping in double perovskite $\text{SmBa}_{1-x}\text{Ca}_x\text{Co}_2\text{O}_{5+\delta}$ to enhance the electrochemical activity of solid oxide cell reversible oxygen electrode**, Journal of Alloys and Compounds 933 (2023) 167731. <https://doi.org/https://doi.org/10.1016/j.jallcom.2022.167731>.

T. Vairo, D. Cademartori, D. Clematis, M.P. Carpanese, B. Fabiano, **Solid oxide fuel cells for shipping: A machine learning model for early detection of hazardous system deviations**, Process Safety and Environmental Protection 172 (2023) 184-194. <https://doi.org/https://doi.org/10.1016/j.psep.2023.02.022>.

Marco Lagnoni, Davide Cademartori, Monica Puccini, Maria Paola Carpanese, Antonio Bertei, **Requirements for Applying the Current Interruption Technique for Reconstructing the Impedance of Li-Ion Batteries** - accepted manuscript - Journal of the Electrochemical Society, 2025.

Davide Cademartori, Ángel Triviño Peláez, Maxime Hubert, Maria Paola Carpanese, Jérôme Laurencin, **Understanding the Microstructure-Performance Correlations of Infiltrated Freeze Tape Cast Electrodes for Solid Oxide Cells by Physics-based Modelling** - accepted manuscript - Electrochimica Acta, 2025.

SCIENTIFIC CONFERENCES WITH DELIVERED PRESENTATIONS

Davide Cademartori, Maxime Hubert, M. Paola Carpanese, Jérôme Laurencin – EFCF 2024, July 2024, oral presentation.

"Microstructural and Electrochemical Modeling of Nanostructured SOCs Electrodes"

Davide Cademartori, Maxime Hubert, Elise Bonnet, Jean-Marc Bassat, M. Paola Carpanese, Jérôme Laurencin – Euromech Colloquium 632, September 2023, oral presentation.

"Microstructural Modeling of Infiltrated Electrodes for Solid Oxide Cells (SOCs)".

Davide Cademartori, Maxime Hubert, Jerome Laurencin, Maria Paola Carpanese – XVIII Ecers congress, 2-6 July 2023, oral presentation.

"Microstructural and electrochemical characterization of freeze tape cast fuel electrodes for solid oxide cells (SOCs)".

Davide Cademartori, Davide Clematis, Antonio Maria Asensio, Antonio Bertei, Massimo Viviani, Sabrina Presto, Antonio Barbucci, M. Paola Carpanese – 8th Regional Symposium on Electrochemistry of South-East Europe, 11-15 July 2022, **keynote**.

"The Freeze Tape Casting Technique for the Manufacturing of Graded Porous Scaffolds for Solid Oxide Cells: Experimental Activities and CFD Modelling".

Davide Cademartori, Davide Clematis, Antonio Barbucci, Antonio Maria Asensio, Massimo Viviani, Sabrina Presto, M. Paola Carpanese – 12th International Symposium on Electrochemical Impedance Analysis, Germany, 29-30 November 2021, oral presentation.

"Impedance analysis of copper-based perovskite electrodes for reversible solid oxide cells"

Davide Cademartori, Alessandra Sanson, Elisa Mercadelli, Angela Gondolini, M. Paola Carpanese. – SCI2021 Online Congress, 14-23 September 2021, oral presentation.

"Anode-supporting substrates with hierarchical porosity manufactured with freeze tape casting for reversible solid oxide cells"

SCIENTIFIC CONFERENCES WITH POSTER PRESENTATIONS

Davide Cademartori, Maxime Hubert, Atharva Nilawar, Jerome Laurencin, M. Paola Carpanese – XXIII National Catalysis Congress, Genova, 14-16 June 2023.

"Artificial Impregnation of a Freeze Tape Cast YSZ Scaffold for Solid Oxide Cells (SOCs): Electrode Design Optimization"

Davide Cademartori, Davide Clematis, Antonio Maria Asensio, Elisa Mercadelli, Angela Gondolini, Alessandra Sanson, Antonio Bertei, Massimo Viviani, Sabrina Presto, Antonio Barbucci, M. Paola Carpanese – 32nd Topical Meeting ISE, 19-22 June 2022.

"Freeze Tape Casting for Solid Oxide Cells: Manufacturing and CFD Simulation of Graded Porous Electrodes"

Davide Cademartori, Elisa Mercadelli, Angela Gondolini, Alessandra Sanson, Ahmad El-Kharouf, Robert Steinberger-Wilckens, Davide Clematis, Antonio Maria Asensio, Maria Paola Carpanese – 15th EFCF, 5-8 July 2022.

"Fabrication and CFD modelling of a graded porous scaffold for Reversible Solid Oxide Cells (rSOCs)"

Davide Cademartori, Davide Clematis, Antonio Barbucci, Antonio Maria Asensio, Massimo Viviani, Sabrina Presto, M. Paola Carpanese. – EIA 2021 online congress, 29-30 November 2021.

"Impedance analysis of copper-based perovskite electrodes for reversible solid oxide cells"

SCIENTIFIC CONFERENCES AS COAUTHOR

A.M. Asensio, D. Clematis, D. Cademartori, M. Viviani, S. Presto, M.P. Carpanese, M. Delucchi, M. Panizza, A. Barbucci - 12th International Symposium on Electrochemical Impedance Analysis, Germany, 29-30 November 2021.

"Infiltration of microporous SDC backbone as stable solid oxide cell BSCF-based air electrode"

M. Paola Carpanese, Davide Cademartori, Tiziano Freddi, Davide Clematis, Antonio Barbucci, Antonio Maria Asensio, Marco Panizza, Dario Montinaro - SCI2021 Online Congress, 14-23 September 2021.

"Copper-based perovskite electrodes for reversible solid oxide cells"

MEMBERSHIPS

Italian Chemistry Society – SCI
International society of electrochemistry – ISE

CERTIFICATES

- Professional qualification certificate, Industrial Engineer, 2020.
- Certificate of attendance to "GHG Junior Manager Course", 2019.
- First certificate in English, Level B2, Cambridge Assessment English, 2018.