

## WORK EXPERIENCE

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 **ISC-CNR** – Rome, Italy

**City:** Rome | **Country:** Italy

**Research fellow at ISC-CNR (Istituto dei Sistemi Complessi - Consiglio Nazionale delle Ricerche).**

[ 2021 – 2022 ]

I have worked in the Si-DRIVE project: an european project that aim to develop new generation Lithium Ion Batteries. In particular, i have focused on the characterization of the interface between the Silicon anode and the Ionic Liquid electrolyte.

 **University of Rome "La Sapienza"** – Rome, Italy

**City:** Rome | **Country:** Italy

**Laboratory Tutor**

[ 2016 – 2018 ]

Laboratory assistant and tutor in Analitical Chemistry and Organic Chemistry classes.

## EDUCATION AND TRAINING

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**PhD in Materials Science**

*University of Rome "La Sapienza"* [ 2022 – Current ]

**Address:** Piazzale Aldo Moro 5, 00185 Rome (Italy)

**Scanning Electron Microscopy Course**

*Media System Lab* [ 23/10/2024 – 24/10/2024 ]

**City:** Rovereto | **Country:** Italy

**Master's degree in Chemistry (Curriculum in Physical-Chemistry)**

*University of Rome "La Sapienza"* [ 2019 – 2020 ]

**Address:** Piazzale Aldo Moro 5, 00185 Rome (Italy) | **Final grade:** 110/110 cum laude | **Thesis:** Metallic Lithium Electrodeposition

**Bachelor's degree in Chemistry**

*University of Rome "La Sapienza"* [ 2016 – 2018 ]

**Address:** Piazzale Aldo Moro 5, 00185 Rome (Italy) | **Final grade:** 110/110 | **Thesis:** Hydrogen Electrocatalytic Evolution

## LANGUAGE SKILLS

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**Mother tongue(s):** Italian

**Other language(s):** English

[2025]

**Impact of the Si Electrode Morphology and of the Added Li-Salt on the SEI Formed Using EMIFSI-Based Ionic-Liquid Electrolytes**

Nicholas Carboni, Sergio Brutti, Oriele Palumbo, Giovanni Battista Appetecchi, Giovanna Maresca, Hugh Geaney, Kevin M. Ryan, Abinaya Sankaran, Michela Ottaviani, Francesco Capitani, Sebastien Fantini, Rongying Lin, Pierre-Alexandre Martin, Mark van del Velden, and Annalisa Paolone

[2025]

**Protein-DNA Competition at the Bio-Nano Interface: Structural and Biological Insights From Graphene Oxide Coronas**

Erica Quagliarini, Francesca Giulimondi, Serena Renzi, Andrea Pirrottina, Alessandra Zingoni, Nicholas Carboni, Daniela Pozzi, Giulio Caracciolo

[2024]

**Fuel Cells – Alkaline Fuel Cell | Anion-Exchange Membranes**

N. Carboni, M.A. Navarra

Chapter in "Encyclopedia of Electrochemical Power Sources (Second Edition)", Volume 5, 2025, Pages 421-436

[2024]

**Composite anion exchange membranes based on graphene oxide for water electrolyzer applications**

N. Carboni, L. Mazzapioda, A. Capri, I. Gatto, A. Carbone, V. Baglio, M. A. Navarra

[2023]

**Super Hygroscopic Non-Stoichiometric Cerium Oxide Particles as Electrode Component for PEM Fuel Cells**

Mazzapioda L., Moscatelli G., Carboni N., Brutti S., Navarra M.A.

[2023]

**Solid-electrolyte interface formation on Si nanowires in Li-Ion batteries: the impact of electrolyte additives**

Sarra A., Brutti S., Palumbo O., Capitani F., Borondics F., Appetecchi G.B., Carboni N., Abdul Ahad S., Geaney H., Ryan K., Paolone A.

[2022]

**Mechanochemical Synthesis and Hydrogen Sorption Properties of a V-Ni Alloy**

Palumbo, O.; Carboni, N.; Trequattrini, F.; Brutti, S.; Paolone, A.

[2021]

**LA63 - Ottimizzazione del processo di elettrodeposizione di elettrodi Li@Cu e aSEI@Li@Cu con densità di capacità controllata**

Brutti S., Ceppetelli A., Messina L., Carboni N., Ciccioli A., Silvestri L.

2nd Deliverable report of the AdP project "Sistemi di Accumulo, compresi elettrochimico e power to gas, e relative interfacce con le reti" - activity LA63

## **Durability and Degradation of Anion Exchange Membranes in Water Electrolyzers**

Nicholas Carboni, Maria Assunta Navarra, Stefano Passerini and Jürgen Garche

In Press

[2025]

### **Reduced Graphene Oxide Supported Ceria As Co-Catalyst For Oxygen Reduction In Low Platinum Loading Acidic Fuel Cells**

Luna Iacobini, Nicholas Carboni, Jorge Montero, Valentina Naticchioni, Riccardo Frisenda, Maria Grazia Betti and Maria Assunta Navarra

In Press

[2025]

### **Composite Anion Exchange Membranes Added with Quaternized Graphene Oxide for Water Electrolyzer Applications**

Nicholas Carboni, Marco Del Natale, Alessandra Carbone, Vincenzo Baglio, Sara Cavaliere, Maria Assunta Navarra

In Preparation

## **CONFERENCES AND SEMINARS**

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[ 23/06/2025 – 25/06/2025 ] Bad Zwischenahn (Germany)

### **EMEA2025: Workshop on Ion Exchange Membranes for Energy Applications**

- Poster Presentation: Composite Anion Exchange Membranes with Quaternized Graphene Oxide for Water Electrolyzer Applications

[ 24/06/2024 – 28/06/2024 ] Rome, Italy

### **Second Symposium for Young Chemists: Innovation and Sustainability (SYNC)**

- Oral Presentation: Composite Anion Exchange Membranes Based on Graphene Oxide for Water Electrolyzer Applications

[ 30/06/2024 – 03/07/2024 ] Milazzo, Italy

### **IX symposium on hydrogen, fuel cells and advanced batteries (Hyceltec)**

- Oral Presentation: Composite Anion Exchange Membranes Based on Graphene Oxide for Water Electrolyzer Applications

[ 09/06/2024 – 12/06/2024 ] Stresa, Italy

### **37th Topical Meeting of the International Society of Electrochemistry**

- Oral Presentation: Composite Anion Exchange Membranes Based on Graphene Oxide for Water Electrolyzer Applications

[ 07/02/2024 – 09/02/2024 ] Rome (Italy)

### **IWES 2024 Third Italian Workshop on Energy Storage**

[ 17/09/2023 – 21/09/2023 ] Cefalù (Italy)

- Poster Presentation: Anion-Exchange Membranes Development for High-Performing and Cost-Effective Water Electrolysis (winner of the best poster award)

[ 03/09/2023 – 08/09/2023 ] Lyon, France

**74th annual meeting of International Society of Electrochemistry**

- Poster Presentation: Anion-Exchange Membranes Development for High-Performing and Cost-Effective Water Electrolysis

[ 13/02/2023 – 17/02/2023 ] Fiesole (Florence), Italy

**Enerchem School**

- Poster Presentation: Towards anodeless lithium metal negative electrodes for secondary aprotic batteries

[ 20/01/2023 – 20/01/2023 ] Rome

**Modeling and understanding of nanostructured materials: an advanced electron nanoscopy overview**

[ 19/06/2022 – 22/06/2022 ] Stockholm, Sweden

**32nd Topical Meeting of the International Society of Electrochemistry**

- Oral Presentation: Towards anodeless lithium metal negative electrodes for secondary aprotic batteries
- Poster Presentation: SEI formed on Si Nanowire electrodes in ionic liquid electrolytes: a micro-spectroscopic investigation

[ 29/11/2021 – 01/12/2021 ] United Kingdom (Online)

**Next Generation Nanoelectrochemistry Faraday Discussion (Royal Society of Chemistry)**

- Poster Presentation: Micro-spectroscopic analysis of the SEI formed on Si Nanowire electrodes in ionic liquid electrolytes

## Experimental experience in:

- Electrochemical techniques (Galvanostatic and Potentiostatic techniques, Cyclic Voltammetry, Impedence Spectroscopy) for the study of batteries, electrolyzers and fuel cells.
- Characterization techniques: FTIR and Raman spectroscopy, Thermogravimetric Analysis, Mechanical Analysis, XRD, XPS, SAXS and SEM.
- Use of Glove boxes and vacuum systems.
- Inorganic synthesis and casting of polymeric membranes

[ 03/02/2025 – 04/08/2025 ]

### PhD abroad period at Institute Charles Gerhardt Montpellier (ICGM), Université de Montpellier

I have worked on my PhD project and the European project "SUSTAINCELL - Durable and Sustainable component supply chain for high performance fuel cells and electrolyzers"

The SUSTAINCELL project aims at supporting the European industry in the development of the next generation electrolyser and fuel cell technologies (both low and high temperature) by developing a sustainable European supply chain of materials, components and cells, significantly less reliant on critical raw materials (CRM), with lower environmental footprint and costs, and higher performance and durability than existing technologies.

[ 31/05/2022 – 06/06/2022 ]

### Beamtime at Synchrotron SOLEIL (St. Aubin, France)

Proposal ID: 20211007

Title: Crystal phase evolution and Solid-Electrolyte Interface in microbatteries containing a TiO<sub>2</sub> negative electrode

[ 21/09/2021 – 27/09/2021 ]

### Beamtime at Synchrotron SOLEIL (St. Aubin, France)

Proposal ID: 20210263

Title: The Solid-Electrolyte-Interphase of innovative Silicon Nanowires anodes for lithium batteries

[ 2020 – 2021 ]

### Internship, University of Rome "La Sapienza"

Aim: contribute to the development of a lithiumless metal electrode to be used as an anode for Lithium Metal Batteries.

Strategies: Electrodeposition studies of metallic lithium on electrodes of different nature, including mesoporous and nanostructured electrodes and development and application of different Artificial-Solid Electrolyte Interface (A-SEI) to improve efficiency of the process of Li stripping/deposition.

## HOBBIES AND INTERESTS

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### Passionate about Art, Music and Science

My main hobby is playing. In particular i play electric guitar, bass guitar and latin percussions (Bongos).