

Nicolò Pianta
Curriculum Vitae for Scientific and Educational Activities

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1 Personal Information and Current Position

- **Born:** Alessandria on 09/01/1993
- **Resident in:** Valenza (AL), Italy
- **Current Position:** Assistant Professor, Scientific Disciplinary Sector CHIM/02 at the Department of Materials Science, University of Milan-Bicocca

2 Education

- **2018/2022:** Ph.D. in Science and Technology of Materials, University of Milan-Bicocca.
Doctoral degree awarded on 23/05/2022.
Thesis Title: “Strategies for the optimization and characterization materials for energy storage”
Supervisor: Prof. Riccardo Ruffo
- **01/2021 - 09/2021:** Guest Student, Fraunhofer Institute for Manufacturing Technology and Advanced Materials (IFAM), Bremen, Germany, under the supervision of Prof. Fabio La Mantia.
- **2015/2017:** Master’s Degree in Chemistry, University of Pavia.
Thesis Title: “Photosynthetic Microbial Fuel Cells (PMFC): Synergy between Bacteria and Microalgae in Simultaneous Water Purification and Biorefinery”
Supervisor: Prof. Eliana Quartarone
Grade: 110/110 with honors
- **2012/2016:** Bachelor’s Degree in Chemistry, University of Pavia.
Thesis Title: “Metal-Organic Frameworks (MOF) as Innovative Materials for Applications in the field of Energy”
Supervisor: Prof. Eliana Quartarone
Grade: 108/110

3 Academic Career

- **07/2023 – Present:** Assistant Professor, University of Milan-Bicocca.
Title of the fellowship: “Progettazione e caratterizzazione di materiali elettroattivi per batterie ricaricabili a ioni alcalini”.
- **04/2024 – 04/2025:** Visiting Researcher, University of Oxford, under the supervision of Prof. Mauro Pasta.
- **10/2022 – 06/2023:** Research Fellow, University of Milan-Bicocca.
Title of the fellowship: “Design and characterization of new deep eutectic solvents (DES) for rechargeable lithium batteries”.
- **09/2021 - 10/2022:** Research Fellow, University of Milan-Bicocca.
Title of the fellowship: “DES Electrolytes for Rechargeable Lithium Batteries”.

- **01/2018 - 10/2018:** Research Fellow, University of Pavia.
Title of the grant: “Network polimerici micro- e mesoporosi come elettroliti innovativi in dispositivi elettrochimici”.

4 Teaching Activities

4.1 Institutional Teaching Activities at the University of Milan-Bicocca

Institutional teaching activities were carried out in the following degree programs:

- **Master Degree in Materials Science (LM-SM):**
Academic Year 2020/21: Supplementary teaching of Applied Physical Chemistry with Laboratory, 8 CFU.
- **Master Degree in Materials Science and Nanotechnology (LM-SM):**
Academic Year 2023/24: Teaching and lab assisting of Fundamentals of Electrochemistry for Energy Storage, 8 CFU.
- **Master Degree in Materials Science and Nanotechnology (LM-SM):**
Academic Year 2024/25: Teaching and lab assisting of Fundamentals of Electrochemistry for Energy Storage, 8 CFU.

4.2 Supervisor for the Following Students

I am or have been a supervisor for the following students:

Name	Degree Program and Year
Davide Locatelli	Master's Degree in Chemistry, University of Milan-Bicocca, 2019
Nicholas Vallana	Bachelor's Degree in Chemistry, University of Milan-Bicocca, 2020
Samuele Galli	Master's Degree in Materials Science, University of Milan-Bicocca, 2022
Dario Tiberti	Bachelor's Degree in Materials Science, University of Milan-Bicocca, 2022
Simone Lombardi	Bachelor's Degree in Chemistry, University of Milan-Bicocca, 2022
Marco Di Mauro	Bachelor's Degree in Materials Science, University of Milan-Bicocca, 2022
David Catic	Bachelor's Degree in Materials Science, University of Milan-Bicocca, 2022
Arslan Ahmad	Master's Degree in Materials Science, University of Milan-Bicocca, 2023
Aman Aslam	Master's Degree in Materials Science, University of Milan-Bicocca, 2023
Matteo Folci	Bachelor's Degree in Materials Science, University of Milan-Bicocca, 2023
Denise Sironi	Bachelor's Degree in Materials Science, University of Milan-Bicocca, 2023
Luca Santori	Bachelor's Degree in Materials Science, University of Milan-Bicocca, 2023

4.3 Other Activities

- **Tutor within the framework of scientific degree programs,** March 2018, University of Pavia.
- **Tutor within the framework of the “RM@School” project,** June 2022, University of Milan-Bicocca.

5 Participation in Scientific Events

5.1 Teaching activities in Ph.D. schools

- **Scientific intervention at the “eNargiZinc School 2”** titled: “Dynamic Electrochemical Impedance Spectroscopy: Probing nonstationary Electrochemical Processes,” 13-14 May 2025, Ulm (Germany)

5.2 Participation in Conferences

5.2.1 Oral Presentations

- **Pianta Nicolò**, Scarpioni Federico, La Mantia Fabio, Ruffo Riccardo; “Dynamic electrochemical impedance spectroscopy as a tool for the study of energy storage systems”; 76th Annual Meeting of ISE; Mainz (DE); 7-12 September 2025
- **Pianta Nicolò**, Scarpioni Federico, La Mantia Fabio, Ruffo Riccardo; “Dynamic electrochemical impedance spectroscopy as a tool for the study of energy storage systems”; ; 1st ACee-GISEL Joint Conference; Padova (IT); 21-23 July 2025; **(Invited)**
- **Pianta Nicolò**; “Cathodes: NASICON and Fluorophosphates”; E-TECH Europe 2025; Bologna (IT); 15-16 April 2025
- **Pianta Nicolò**, Ruffo Riccardo; “Strategies for the optimization and characterization of materials for energy storage”; XXVIII Congresso Nazionale della Società Chimica Italiana; Milano (IT); 26-30 August 2024
- Brugnetti Gabriele, **Pianta Nicolò**, Triolo Claudia, Massaro Arianna, Ostroman Irene, Ferrara Chiara, Sheptyakov Denis, Muñoz-García Ana Belén, Pavone Michele, Santangelo Saveria, Ruffo Riccardo; “On the structural evolution of air-exposed layered oxide cathodes for sodium-ion batteries: the example of Sodium Manganese Nickel Oxide”; Giornate dell’Elettrochimica Italiana 2023 (GEI 2023); Cefalù (IT); 17-21 September 2023
- **Pianta Nicolò**, Federico Scarpioni, Richard Chukwu, Fabio La Mantia, Riccardo Ruffo; “Monitor the electrochemical behaviour of battery materials operando by means of Dynamic Electrochemical Impedance Spectroscopy”; Giornate dell’Elettrochimica Italiana 2022 (GEI 2022); Orvieto (IT); 11-15 September 2022
- **Pianta Nicolò**, Federico Scarpioni, Richard Chukwu, Fabio La Mantia, Riccardo Ruffo; “Dynamic Electrochemical Impedance Spectroscopy as a valid tool to monitor EDLCs operando”; International Symposium on Enhanced Electrochemical Capacitors (ISEECap 2022); Bologna (IT); 11-15 July 2022
- **Pianta Nicolò**, Locatelli Davide, Ruffo Riccardo; “High-voltage cathodic materials for sodium ion batteries”; Giornate dell’Elettrochimica Italiana 2019 (GEI 2019); Padova (IT); 8-12 September 2019

5.2.2 Poster Presentations

- Mezzomo Lorenzo, **Pianta Nicolò**, Ostroman Irene, Aloni Niv, Golodnitsky Diana, Peled Emanuel, Mustarelli Piercarlo, Ruffo Riccardo; “Deep eutectic solvents based on Trifluoroacetamide and LiPF₆ as electrolytes for LIBs”; 2nd Italian Workshop on Energy Storage (IWES 2023); Bressanone (IT); 25-27 January 2023
- **Pianta Nicolò**, Galli Samuele, Brugnetti Gabriele, Santoro Carlo, Innocenti Massimo, Rosi Luca, Ruffo Riccardo; “Hard carbons derived from pyrolysis of tires as electrodes for electrochemical storage systems”; XXVII Congresso Nazionale della Società Chimica Italiana (SCI 2021); Congresso in via telematica; 14-23 September 2021
- **Pianta Nicolò**, Baldini Angelica, Tredici G. Ilenia, Anselmi-Tamburini Umberto, Berbenni Vittorio, Mustarelli Piercarlo, Quartarone Eliana; “Mesoporous Inorganic Nanomaterials as Scaffolds for Quasi-Solid Electrolytes for LIBs”; 69th Annual Meeting of the International Society of Electrochemistry; Bologna (IT); 02-07 September 2018

5.3 Organized Events

- **Giornate dell'Elettrochimica Italiana 2025**, *Member of the Organizing Committee*; 15-16 September, San Benedetto del Tronto, Italy
- **37th ISE Topical Meeting**: “Electrochemical Energy for a Greener and more Sustainable Future Society,” *Member of the Local Organizing Committee*; 9-12 June 2024, Stresa, Italy

5.4 Awards for Contributions to Conferences

- **Best Ph.D. thesis Award**, Fondazione Oronzio e Niccolò De Nora, at the XXVIII Congresso Nazionale della Società Chimica Italiana, Milano, Italy, August 26-30, 2024
- **Best Oral Award**, at the Italian Electrochemistry Days 2022 (GEI 2022), Orvieto, Italy, September 11-15, 2022

6 Scientific Activities

6.1 Brief Overview of Research Areas

The research activity began with the biological, chemical, and electrochemical study of microbial fuel cells. In this context, potentiodynamic measurements were carried out for power calculation, as well as impedance spectroscopy measurements. Various types of polymer synthesis and the preparation of proton-conductive membranes were also explored. Subsequently, the activity shifted towards the characterization of materials for alkaline ion batteries, including electrodes and electrolytes, and advanced electrochemical characterization of interfaces and electrochemical kinetics using dynamic impedance spectroscopy and related techniques. These works have led to the development and implementation of characterization methodologies capable of addressing a significant

number of different cases, as demonstrated by the works related to the use of dynamic impedance in energy storage devices.

The research activity can be divided into four main areas in the study and electrical and electrochemical characterization of inorganic and organic materials for:

1. Polymer membrane fuel cells;
2. Supercapacitors with aqueous electrolytes;
3. Rechargeable alkaline ion batteries;
4. Electrolysers.

6.2 Main National Scientific Collaborations

- University of Milan-Bicocca; Prof. Piercarlo Mustarelli, Prof. Luca Beverina, Prof. Roberto Lorenzi.
- Mediterranean University of Reggio Calabria; Prof. Saveria Santangelo.
- Polytechnic University of Turin; Prof. Claudio Gerbaldi.
- University of Pavia; Prof. Eliana Quartarone, Prof. Paolo Ghigna.

6.3 Main International Scientific Collaborations

- Oxford University (United Kingdom); Prof. Mauro Pasta.
- Bremen University (Germany); Prof. Fabio La Mantia.
- Tel Aviv University; Prof. Diana Golodnitsky, Prof. Emanuel Peled.

6.4 Referee Activity for Journals with Peer Review

The activity is carried out (with a frequency of approximately 5-10 works per year) for international scientific journals, both generalist and specialized in physical chemistry and electrochemistry, including: *Batteries*, *Next Energy*, *Journal of Alloys and Compounds*.

6.5 Guest Editor

Guest editor for the special edition “Promising Carbon-Based Materials for Energy Storage” *Batteries*.

6.6 Publications

6.6.1 Bibliometrics

I have published, as an author or co-author, 30 scientific papers indexed in SCOPUS, including 29 articles. Among the most frequently recurring journals, there are **6** in *Electrochimica Acta*, **3** in *Journal of Power Sources*.

As of the present date, the bibliometric values are as follows:

- H-index: 10

- Total number of citations: 367
- Corresponding author for 3 of the 30 scientific works
- First author for 4 of the 30 scientific works

Complete list of publications (SCOPUS) in reverse chronological order

- [1] Gentile, A., Pianta, N., Fracchia, M., Pollastri, S., Ferrara, C., Marchionna, S., Aquilanti, G., Tosoni, S., Ghigna, P., & Ruffo, R. (2025). Ti₃C₂Tx mxenes as anodes for sodium-ion batteries: The in situ comprehension of the electrode reaction. *ACS Applied Energy Materials*, 8(4), 2229–2238. <https://doi.org/10.1021/acsaem.4c02777>
- [2] Muhyuddin, M., Pianta, N., Trindell, J. A., Ruffo, R., Santoro, C., & Koper, M. T. (2025). Cation effects on the hydrogen evolution reaction by catalysts based on cobalt complexes in alkaline electrolytes. *Electrochimica Acta*, 535. <https://doi.org/10.1016/j.electacta.2025.146684>
- [3] Pianta, N., Florenzano, D. A., Lorenzi, R., Navarini, L., Santoro, C., & Ruffo, R. (2025). Hard carbon derived from spent coffee grounds for applications in sodium ions batteries. *Advanced Sustainable Systems*, 9(5). <https://doi.org/10.1002/adsu.202500027>
- [4] Sala, M., Orfano, M., Secchi, V., Mattei, I., Pianta, N., Zabloudil, V., Lowis, C., Kučerková, R., Nikl, M., Meinardi, F., Auffray, E., Villa, I., & Monguzzi, A. (2025). Highly luminous scintillating nanocomposites enable ultrafast time coincidence resolution for γ -rays detection with heterostructured multilayer scintillators. *Advanced Functional Materials*, 35(17). <https://doi.org/10.1002/adfm.202421434>
- [5] Bartoli, M., Piovano, A., Elia, G. A., Meligrana, G., Pedraza, R., Pianta, N., Tealdi, C., Pagot, G., Negro, E., Triolo, C., Gomez, L. V., Comisso, N., Tagliaferro, A., Santangelo, S., Quartarone, E., Di Noto, V., Mustarelli, P., Ruffo, R., & Gerbaldi, C. (2024). Pristine and engineered biochar as na-ion batteries anode material: A comprehensive overview. *Renewable and Sustainable Energy Reviews*, 194. <https://doi.org/10.1016/j.rser.2024.114304>
- [6] Carena, E., Brambilla, D., Vergani, M., Morina, R., Pianta, N., & Ferrara, C. (2024). Low-temperature carbothermic reduction for recycling licoo₂ for the recovery of critical raw materials: The role of cellulose. *Energy and Fuels*, 38(18), 18044–18053. <https://doi.org/10.1021/acs.energyfuels.4c02714>
- [7] Carena, E., Morina, R., Brugnetti, G., Pianta, N., Binetti, S. O., & Ferrara, C. (2024). The recycling of lithium-ion batteries licoo₂ cathode: Balancing sustainability and efficiency. *Journal of Chemical Education*, 101(5), 2124–2133. <https://doi.org/10.1021/acs.jchemed.4c00204>
- [8] Khalid, S., Pellini, I. C., Pianta, N., Lorenzi, R., Leonardi, S., Meda, L., Rizzo, C., Roccaro, E., Johansson, P., Mustarelli, P., & Ruffo, R. (2024). Stable lithium-ion batteries based on a hybrid aqueous/organic electrolyte. *Journal of Power Sources*, 612. <https://doi.org/10.1016/j.jpowsour.2024.234803>

- [9] Mirshokraee, S. A., Muhyuddin, M., Pianta, N., Berretti, E., Capozzoli, L., Orsilli, J., D’Acapito, F., Viscardi, R., Cosenza, A., Atanassov, P., Santoro, C., & Lavacchi, A. (2024). Ni-phthalocyanine derived electrocatalysts for oxygen reduction reaction and hydrogen evolution reaction: Active sites formation and electrocatalytic activity. *ACS Catalysis*, *14*(19), 14524–14538. <https://doi.org/10.1021/acscatal.4c03814>
- [10] Morina, R., Carena, E., Pianta, N., Perona, E., Ostroman, I., Mustarelli, P., & Ferrara, C. (2024). Phase-separated solvothermal high yields recovery of lithium and cobalt cathode precursors from end-of-life licoo2 lithium-ion batteries. *Journal of Environmental Management*, *370*. <https://doi.org/10.1016/j.jenvman.2024.122827>
- [11] Ostroman, I., Vallana, N., Marchionna, S., Gentile, A., Ferrara, C., Pellini, I. C., Fracchia, M., Pianta, N., & Ruffo, R. (2024). Oxidized ti3al(1-x)snxc2 max phases as negative electrode materials for sodium ion batteries. *Journal of Power Sources*, *624*. <https://doi.org/10.1016/j.jpowsour.2024.235543>
- [12] Rosa, C., Ravalli, M., Pianta, N., Mustarelli, P., Ferrara, C., Quartarone, E., Malavasi, L., Sheptyakov, D., & Tealdi, C. (2024). Aliovalent substitution in li3incl6: A combined experimental and computational investigation of structure and ion diffusion in lithium-halide solid state electrolytes. *ACS Applied Energy Materials*, *7*(10), 4314–4323. <https://doi.org/10.1021/acsaem.4c00065>
- [13] Zuccante, G., Acciarri, M., Vecchio, C. L., Gatto, I., Baglio, V., Pianta, N., Ruffo, R., Navarini, L., & Santoro, C. (2024). Oxygen reduction reaction platinum group metal-free electrocatalysts derived from spent coffee grounds. *Electrochimica Acta*, *492*. <https://doi.org/10.1016/j.electacta.2024.144353>
- [14] Brugnetti, G., Pianta, N., Ferrara, C., Tribbia, M., Zampardi, G., La Mantia, F., Goikolea, E., Ruiz de Larramendi, I., Lezama, L., Rojo, T., & Ruffo, R. (2023). The role of surface coating in p’2-na0.67mn0.67ni0.33o2: Enhancing capacity and stability of layered cathodes for sodium-ion batteries. *Batteries and Supercaps*, *6*(12). <https://doi.org/10.1002/batt.202300332>
- [15] Brugnetti, G., Triolo, C., Massaro, A., Ostroman, I., Pianta, N., Ferrara, C., Sheptyakov, D., Muñoz-García, A. B., Pavone, M., Santangelo, S., & Ruffo, R. (2023). Structural evolution of air-exposed layered oxide cathodes for sodium-ion batteries: An example of ni-doped naxmno2. *Chemistry of Materials*, *35*(20), 8440–8454. <https://doi.org/10.1021/acs.chemmater.3c01196>
- [16] Ceriani, C., Scagliotti, M., Losi, T., Luzio, A., Mattiello, S., Sassi, M., Pianta, N., Rapisarda, M., Mariucci, L., Caironi, M., & Beverina, L. (2023). Organic solvent free synthesis and processing of semiconducting polymers for field effect transistors in waterborne dispersions. *Advanced Electronic Materials*, *9*(5). <https://doi.org/10.1002/aelm.202201160>
- [17] Khalid, S., Pianta, N., Bonizzoni, S., Ferrara, C., Lorenzi, R., Paleari, A., Johansson, P., Mustarelli, P., & Ruffo, R. (2023). Structure-property correlations in aqueous binary na+/k+-ch3coo- highly concentrated electrolytes. *Journal of Physical Chemistry C*, *127*(20), 9823–9832. <https://doi.org/10.1021/acs.jpcc.3c01017>
- [18] Khalid, S., Pianta, N., Mustarelli, P., & Ruffo, R. (2023). Use of water-in-salt concentrated liquid electrolytes in electrochemical energy storage: State of the art and perspectives. *Batteries*, *9*(1). <https://doi.org/10.3390/batteries9010047>
- [19] Mezzomo, L., Pianta, N., Ostroman, I., Aloni, N., Golodnitsky, D., Peled, E., Mustarelli, P., & Ruffo, R. (2023). Deep eutectic solvent electrolytes based on trifluoroacetamide and lipf6 for li-metal batteries. *Journal of Power Sources*, *561*. <https://doi.org/10.1016/j.jpowsour.2023.232746>

- [20] Pianta, N., Scarpioni, F., Chukwu, R., La Mantia, F., & Ruffo, R. (2023). Evaluation of kinetic parameters of non-faradic processes in carbon-based electrodes using multisine dynamic electrochemical impedance spectroscopy. *Electrochimica Acta*, 437. <https://doi.org/10.1016/j.electacta.2022.141462>
- [21] Scarpioni, F., Khalid, S., Chukwu, R., Pianta, N., La Mantia, F., & Ruffo, R. (2023). Electrochemical impedance spectroscopy for electrode process evaluation: Lithium titanium phosphate in concentrated aqueous electrolyte. *ChemElectroChem*, 10(9). <https://doi.org/10.1002/celec.202201133>
- [22] Porporato, S., Bartoli, M., Piovano, A., Pianta, N., Tagliaferro, A., Elia, G. A., Ruffo, R., & Gerbaldi, C. (2022). Repurposing face masks after use: From wastes to anode materials for na-ion batteries. *Batteries*, 8(10). <https://doi.org/10.3390/batteries8100183>
- [23] Stigliano, P., Ferrara, C., Pianta, N., Gentile, A., Mezzomo, L., Lorenzi, R., Berbenni, V., Ruffo, R., Appetecchi, G. B., & Mustarelli, P. (2022). Physicochemical properties of pyr13tfsi-natfsi electrolyte for sodium batteries. *Electrochimica Acta*, 412. <https://doi.org/10.1016/j.electacta.2022.140123>
- [24] Pianta, N., Locatelli, D., & Ruffo, R. (2021). Cycling properties of na₃v₂(po₄)₂f₃ as positive material for sodium-ion batteries. *Ionics*, 27(5), 1853–1860. <https://doi.org/10.1007/s11581-021-04015-y>
- [25] Stigliano, P. L., Pianta, N., Bonizzoni, S., Mauri, M., Simonutti, R., Lorenzi, R., Vigani, B., Berbenni, V., Rossi, S., Mustarelli, P., & Ruffo, R. (2021). A physicochemical investigation of highly concentrated potassium acetate solutions towards applications in electrochemistry. *Physical Chemistry Chemical Physics*, 23(2), 1139–1145. <https://doi.org/10.1039/d0cp04151c>
- [26] Ghigna, P., Airoidi, L., Fracchia, M., Callegari, D., Anselmi-Tamburini, U., D'angelo, P., Pianta, N., Ruffo, R., Cibir, G., De Souza, D. O., & Quartarone, E. (2020). Lithiation mechanism in high-entropy oxides as anode materials for li-ion batteries: An operando xas study. *ACS Applied Materials and Interfaces*, 12(45), 50344–50354. <https://doi.org/10.1021/acsami.0c13161>
- [27] Modafferi, V., Triolo, C., Fiore, M., Palella, A., Spadaro, L., Pianta, N., Ruffo, R., Patanè, S., Santangelo, S., & Musolino, M. G. (2020). Effect of hematite doping with aliovalent impurities on the electrochemical performance of α -fe₂o₃@rgo-based anodes in sodium-ion batteries. *Nanomaterials*, 10(8), 1–18. <https://doi.org/10.3390/nano10081588>
- [28] Tavani, F., Fracchia, M., Pianta, N., Ghigna, P., Quartarone, E., & D'Angelo, P. (2020). Multivariate curve resolution analysis of operando xas data for the investigation of the lithiation mechanisms in high entropy oxides. *Chemical Physics Letters*, 760. <https://doi.org/10.1016/j.cplett.2020.137968>
- [29] Tribbia, M., Pianta, N., Brugnetti, G., Lorenzi, R., & Ruffo, R. (2020). A new double layer super-capacitor made by free-standing activated carbon membranes and highly concentrated potassium acetate solutions. *Electrochimica Acta*, 364. <https://doi.org/10.1016/j.electacta.2020.137323>
- [30] Pianta, N., Baldini, A., Ferrara, C., Anselmi-Tamburini, U., Milanese, C., Mustarelli, P., & Quartarone, E. (2019). A safe quasi-solid electrolyte based on a nanoporous ceramic membrane for high-energy, lithium metal batteries. *Electrochimica Acta*, 320. <https://doi.org/10.1016/j.electacta.2019.07.050>