

Arcangelo Celeste

RTD-A Researcher

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Work Experience

From April 2023: RTD-A researcher at Sapienza University of Rome. Project: PE2 Partenariato Esteso denominato NEST - Network 4 Energy Sustainable Transition. Spoke: 5. Supervisor: Prof. Sergio Brutti.

November 2021 – March 2023: postdoctoral fellow at Sapienza University of Rome and ENEA-Casaccia. Project: Study of electropositive materials for aprotic batteries. Supervisor: Prof. Sergio Brutti.

January 2018 – October 2018: fellow at Italian Institute of Technology (IIT). Project: Development of cathodes with higher specific capacity for Lithium devices. Supervisor: Dr. Vittorio Pellegrini.

Education

November 2018 – October 2021: PhD in Sciences and Technologies of Chemistry and Materials at University of Genoa. Dissertation: Design and characterization of doped Lithium Rich Layered Oxides for Lithium Ion Battery. Supervisors: Prof. Liberato Manna. Dr. Vittorio Pellegrini. Prof Daniele Marrè.

November 2020 – March 2021: Visiting PhD student at Uppsala University, department of chemistry. Supervisor: Prof. Daniel Brandell.

January 2020 – March 2020: Visiting PhD student at ENEA, department of Energy Technologies and Renewable Sources. Supervisor: Dr. Laura Silvestri.

October 2015 – October 2017: Master's Degree in Chemical Sciences (110/110 cum laude) at University of Basilicata. Thesis: Study of lithiation/de-lithiation process by micro-Raman spectroscopy in TiO₂ as an anode for Lithium Ion Batteries. Supervisor: Prof. Sergio Brutti.

June 2015: Bachelor's Degree in Chemistry at University of Basilicata. Thesis: Pulsed laser deposition of Al₂O₃ for depth profiling measurements. Supervisor: Prof. Angela De Bonis.

Publications

- 1) A. Celeste, L. Silvestri, M. Agostini, M. Sadd, S. Palumbo, J.K. Panda, A. Matic, V. Pellegrini, S. Brutti, Enhancement of Functional Properties of Liquid Electrolytes for Lithium-Ion Batteries by Addition of Pyrrolidinium-Based Ionic Liquids with Long Alkyl-Chains, *Batter Supercaps*. 3 (2020) 1059–1068. <https://doi.org/10.1002/batt.202000070>.
- 2) A. Celeste, M. Tuccillo, A. Santoni, P. Reale, S. Brutti, L. Silvestri, Exploring a Co-Free, Li-Rich Layered Oxide with Low Content of Nickel as a Positive Electrode for Li-Ion Battery, *ACS Appl Energy Mater.* (2021) acsaem.1c02133. <https://doi.org/10.1021/acsaem.1c02133>.
- 3) A. Celeste, R. Brescia, G. Greco, P. Torelli, S. Mauri, L. Silvestri, V. Pellegrini, S. Brutti, Pushing Stoichiometries of Lithium-Rich Layered Oxides Beyond Their Limits, *ACS Appl Energy Mater.* 5 (2022) 1905–1913. <https://doi.org/10.1021/acsaem.1c03396>.
- 4) M. Tuccillo, A. Costantini, A. Celeste, A.B.M. García, M. Pavone, A. Paolone, O. Palumbo, S. Brutti, NAl/Li Antisite Defects in the Li_{1.2}Ni_{0.2}Mn_{0.6}O₂ Li-Rich Layered Oxide: A DFT Study, *Crystals (Basel)*. 12 (2022). <https://doi.org/10.3390/cryst12050723>.
- 5) M. Palluzzi, L. Silvestri, A. Celeste, M. Tuccillo, A. Latini, S. Brutti, Structural Degradation of O3-NaMnO₂ Positive Electrodes in Sodium-Ion Batteries, *Crystals (Basel)*. 12 (2022). <https://doi.org/10.3390/cryst12070885>.
- 6) A. Celeste, F. Girardi, L. Gigli, V. Pellegrini, L. Silvestri, S. Brutti, Impact of Overlithiation and Al doping on the battery performance of Li-rich layered oxide materials, *Electrochim Acta*. 428 (2022). <https://doi.org/10.1016/j.electacta.2022.140737>.
- 7) A. Celeste, R. Brescia, L. Gigli, J. Plaisier, V. Pellegrini, L. Silvestri, S. Brutti, Unravelling structural changes of the Li_{1.2}Mn_{0.54}Ni_{0.13}Co_{0.13}O₂ lattice upon cycling in lithium cell, *Materials Today Sustainability*. 21 (2023). <https://doi.org/10.1016/j.mtsust.2022.100277>.
- 8) A. Celeste, M. Paolacci, P.G. Schiavi, S. Brutti, M.A. Navarra, L. Silvestri, Understanding the Impact of Fe-Doping on the Structure and Battery Performance of a Co-Free Li-Rich Layered Cathodes, *ChemElectroChem*. (2023). <https://doi.org/10.1002/celec.202201072>.

- 9) A. Laezza, A. Celeste, M. Curcio, R. Teghil, A. de Bonis, S. Brutti, A. Pepe, B. Bochicchio, Cellulose Nanocrystals as Additives in Electrospun Biocompatible Separators for Aprotic Lithium-Ion Batteries, *ACS Appl Polym Mater.* (2023). <https://doi.org/10.1021/acsapm.2c01956>.
- 10) L. Silvestri, A. Celeste, M. Tuccillo, S. Brutti, Li-rich Layered Oxides: Structure and Doping Strategies to Enable Co-Poor/Co-Free Cathodes for Li-Ion Batteries, *Crystals.* 13 (2023). <https://doi.org/10.3390/cryst13020204>.
- 11) M. Curcio, S. Brutti, A. Celeste, A. Galasso, A. De Bonis, R. Teghil, Influence of Deposition Conditions and Thermal Treatments on Morphological and Chemical Characteristics of $\text{Li}_{6.75}\text{La}_3\text{Zr}_{1.75}\text{Ta}_{0.25}\text{O}_{12}$ Thin Films Deposited by Nanosecond PLD, *Coatings.* 13 (2023). <https://doi.org/10.3390/coatings13091496>.
- 12) A. Celeste, M. Tuccillo, A. S. Menon, W. Brant, D. Brandell, V. Pellegrini, R. Brescia, L. Silvestri, S. Brutti, On the Elusive Crystallography of Lithium-Rich Layered Oxides: Novel Structural Models, *Small Methods.* (2024). <https://doi.org/10.1002/smtd.202301466>.

Conference

Silvestri, L., Marasco, L., Celeste, A., Del Rio-Castillo, A.E., Bonaccorso, F., Pellegrini, V. " Silicon nanoparticles wrapped between few-layer graphene flakes as anodic material for Li-ion batteries". Graphene 2018, Dresden, June 25-29, 2018.

Silvestri, L., Celeste, A., Pellegrini, V., Brutti, S. "Ionic liquids based electrolytes for advanced cathode materials". 6th Edition of the International Meeting on Ionic Liquids for Electrochemical Devices (ILED-6). Roma, September 08-10, 2018.

Celeste, A., Silvestri, L, Pellegrini, V, Brutti, S. "Ionic liquids based electrolytes for advanced cathode materials" Merck & Elsevier Young Chemists Symposium. Rimini, November 19-21, 2018. Poster Presentation.

Celeste, A., Silvestri, L, Brutti, S., Pellegrini, V. "Lithium rich transition metal oxides as high capacity positive electrode materials in Li-ion cells". Padova, Giornate dell'elettrochimica Italiana, September 8-12, 2019. Poster Presentation.

Celeste, A., Silvestri, L, Brutti, S., Pellegrini, V. "Lithium-Rich layered oxides as a positive materials for Lithium-Ion Batteries". NanoInnovation, Roma, September 15-18, 2020. Oral Presentation.

Celeste, A., Silvestri, L., Brutti, S., Pellegrini, V. "Effect of Li and Al-Doping on the electrochemical properties of Lithium-Rich Layered Oxides". NanoInnovation, Roma, September 21-24, 2021. Oral Presentation.

Celeste, A., Silvestri, L., Pellegrini, V., Brutti, S. "Lithium Rich Layered Oxides as cathode materials for Lithium Ion Batteries". First Symposium for YouNg Chemists: Innovation and Sustainability (SYNC), Roma, June 20-23, 2022. Oral Presentation.

Celeste, A., Silvestri, L., Pellegrini, V., Brutti, S. "Investigation of the effect of Li- and Al- co-doping on electrochemical properties of Li-rich layered oxides". XLVIII National Congress of Physical Chemistry. Genova, July 04-07, 2022. Oral Presentation.

Celeste, A., Paolacci, M., Navarra, M., Brutti, S., Silvestri, L. "Investigation of the effect of iron doping on electrochemical properties of Li-rich transition metal oxides". Orvieto, Giornate dell'elettrochimica Italiana, September 11-15, 2022. Oral Presentation.

Celeste, A., Silvestri, L., Brutti, S. "Structure and Doping of Lithium Rich Layered Oxides as a cathode materials for Lithium Ion Batteries". Daytona Beach (FL), 47th International Conference and Expo on Advanced Ceramics and Composites (ICACC2023), January 22 – 27, 2023. Oral Presentation.

Celeste, A., Tuccillo, M., Silvestri, L., Brutti, S. "Crystal Structure and Electrochemical Behavior in Doped Li-Rich Layered Oxides for rechargeable Lithium Cells". Lione, 74th Annual ISE Meeting, September 3 – 8, 2023. Oral Presentation.

Celeste, A., Tuccillo, M., Silvestri, L., Brutti, S. "Modeling of Crystal Structure in Li-Rich Layered Oxides for Rechargeable Lithium Cells". Goteborg, 244th ECS Meeting, October 8 – 12, 2023. Oral Presentation.

Celeste, A., Tuccillo, M., Silvestri, L., Brutti, S. "Doping Strategy to improve the electrochemical behavior of Lithium Rich Transition Metal Oxides as cathodes for Lithium-Ion Batteries". Goteborg, 244th ECS Meeting, October 8 – 12, 2023. Poster Presentation.

Patents

- 1) Celeste, Arcangelo, Laura Silvestri, Sergio Brutti and Vittorio Pellegrini. "Materiale di ossidi di metalli di transizione ricco di litio" Italian Patent Application N. IT 102020000016966, filed on July 07th, 2020.

- 2) Celeste, Arcangelo, Laura Silvestri, Sergio Brutti and Vittorio Pellegrini. “Li-Rich Transition Metal Oxides Material” PCT International Application N. PCT/IB2021/056279 (Related to the Italian Application), filed on July 13th, 2021.

Awards

Giovanni Semerano Award 2022. Best PhD thesis in Physical Chemistry, awarded by Italian Chemical Society.

Membership

Italian Chemical Society (SCI)

International Society of Electrochemistry (ISE)

Additional Information

Techniques and technical skills:

- Setting-up and preparation of an electrochemical energy storage laboratory.
- Electrochemical methods of analysis and testing, i.e. voltammetries, galvanostatic cycling, electrochemical impedance spectroscopy.
- Synthesis of positive/negative materials and preparation of electrode films and electrolytes.
- Cells assembly by using a dry-box equipment.
- Chemical-physical methods of analysis, i.e. X-Ray Diffraction, Raman Spectroscopy, Scanning and Transmission Electron Microscopy, Thermogravimetric Analysis, X-Ray Absorption Spectroscopy.

Technical skill software:

- Editing: Microsoft Word, Microsoft PowerPoint, Adobe Dimension.
- Reference management, i.e. Mendeley.
- Data analysis: OriginLab, Microsoft Excel, Matlab (basic).
- Electrochemical analysis: EC-Lab software, MACCOR software.
- Structural analysis: GSAS-II, FAULTS, CaRIne crystallography software, PowderCell, VESTA software.