

# Hamideh Darjazi

## Education

**PhD in Chemistry**     January 2018- September 2021

School of Science and Technology, Chemistry Division, University of Camerino, Italy

*" Synthesis and Structural/Electrochemical Characterization of Nanostructured Electrode Materials for Lithium- and Sodium-Ion Batteries. Hard Carbon Anodes and High-Voltage Cathodes"*

**M.S. in Materials Science and Engineering**     September 2013- September 2015

Department of Materials, University of Isfahan, Isfahan, Iran

*" Improvement of the supercapacitive ability of Manganese oxide nanostructures by transition metal doping "*

## Work Experiences

### University of Camerino

Position: PhD student

Scholarship of Camerino university

Research experience:

- Enhancement of  $\text{LiNi}_x\text{Mn}_y\text{Co}_z\text{O}_2$  (NMC) cathode materials by modification: synthesis, structural, electrochemical, and electronic/ionic transport behaviors.
- A comparative investigation of binder effects on the electrochemical performances of food-waste derived hard carbon anode materials for Li/Na ion batteries and supercapacitors: synthesis, structural, electrochemical, and electronic/ionic transport behaviors.
- Half-cell and full-cell applications of Na-ion batteries based on  $\text{Na}_{2/3}\text{Mn}_{0.8}\text{Fe}_{0.1}\text{Ti}_{0.1}\text{O}_2$  / hard carbon.

Under the supervision of Francesco Nobili.

Contact: [francesco.nobili@unicam.it](mailto:francesco.nobili@unicam.it)

### CIC Energigune

Position: 6 months PhD research stay

Research experience:

- Improvement of high-voltage Ni-rich ( $\text{LiNi}_{0.8}\text{Mn}_{0.1}\text{Co}_{0.1}\text{O}_2$ ) cathode materials by modification for next-generation Li-ion batteries: synthesis, structural, electrochemical, and electronic/ionic transport behaviors.
- Effect of nitrogen doping on  $\text{LiNi}_{0.5}\text{Mn}_{1.5}\text{O}_4$  sputtered thin films as high voltage cathode materials for Li-ion batteries; synthesis, structural, electrochemical, and electronic/ionic transport behaviors. Under the supervision of Miguel Ángel Muñoz-Márquez.

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## Conference contributions

- Improving high-voltage Ni-rich ( $\text{LiNi}_{0.8}\text{Mn}_{0.1}\text{Co}_{0.1}\text{O}_2$ ) cathode materials by modification for next-generation Li-ion batteries, **H. Darjazi**, E. Gonzalo, M. Zarrabeitia, B. Acebedo, R. Cid, I. Madinabeitia, M.Á. Muñoz-Márquez, F. Nobili, IWES2021 energy storage, 24-26 February 2020, Italy (**Oral**).
- Olive leaves derived hard carbon materials for Li/Na-ion battery and supercapacitor applications. **H. Darjazi**, A. Staffolani, L. Sbrascini, F. Nobili, R. Tossici, Nanoinnovation, 15-18 September 2020, Rome, Italy (**Oral**).
- Moving towards NMC811 for next-generation Li-ion batteries, **H. Darjazi**, E. Gonzalo, M. Zarrabeitia, B. Acebedo, R. Cid, I. Madinabeitia, M.Á. Muñoz-Márquez, F. Nobili, Bridging two centuries of electrochemical energy storage and conversion, 4-5 February 2021, Camerino, Italy (**Oral**).
- Fast charging anode for LIBs and NIBs based on  $\text{Fe}_3\text{O}_4/\text{rGO}$ : Synthesis and characterization, A. Staffolani, **H. Darjazi**, L. Sbrascini, L. Bottoni, R. Tossici, F. Nobili, IWES2021 energy storage, 24-26 February 2020, Italy (**Oral**).
- Improvement of structural and electrochemical properties of NMC cathode materials by combined doping and coating, **H. Darjazi**, A. Staffolani, F. Nobili, R. Tossici, Advanced Lithium Batteries for Automobile Applications ABAA 12, 6-9 October 2019, Ulm, Germany (**Poster**).
- Influences of various binders on electrochemical performances of Biowaste Derived Hard Carbon negative electrode materials for Li /Na ion batteries, **H. Darjazi**, A. Staffolani, F. Nobili, R. Tossici, Advanced Lithium Batteries for Automobile Applications ABAA 12, 6-9 October 2019, Ulm, Germany (**Poster**).
- Hard carbon materials for Li/Na-ion battery and supercapacitor applications, **H. Darjazi**, A. Staffolani, F. Nobili, R. Tossici, Advanced Lithium Batteries for Automobile Applications ABAA 12, 6-9 October 2019, Ulm, Germany (**Poster**).
- Synthesis and characterization of high/performance and stability  $\text{SnO}_2/\text{C}$  composite anode for Li-ion batteries, A. Staffolani, **H. Darjazi**, R. Tossici, F. Nobili, Advanced Lithium Batteries for Automobile Applications ABAA 12, 6-9 October 2019, Ulm, Germany (**Poster**).
- Synthesis and characterization of  $\text{TiO}_2@\text{SnO}_2$  nanocomposite as viable anode for Lithium-ion batteries, A. Staffolani, **H. Darjazi**, R. Tossici, F. Nobili, Advanced Lithium Batteries for Automobile Applications ABAA 12, 6-9 October 2019, Ulm, Germany (**Poster**).
- Influence of modification on  $\text{LiNi}_{0.33}\text{Mn}_{0.33}\text{Co}_{0.33}\text{O}_2$  (NMC 333) for Li-ion batteries, 6th Scientific Day della Scuola di Scienze e Tecnologie, 2018, Camerino, Italy (**Poster**).
- Improvement of the supercapacitor ability of Manganese oxide structures by doping, **H. Darjazi**, M. Amiri, S.S. Hosseiny Davarani, H.R. Moazami, F. Tabatabaei, 2<sup>nd</sup> National Conference On Innovative Technologies In Chemical And Petrochemical, 15 May 2015, Shahid Beheshti University, Tehran, Iran, DNW certification (**Poster**).

- Synthesis and characterization of nickel oxide nanoparticles using gamma rays, **H. Darjazi**, S.S. Hosseiny Davarani, A. Norouzi, H.R. Moazami, applied research in science and engineering, 11 March 2015, Tehran, Iran (**Poster**).
- Review of the effect of doping on the features of nano Manganese oxide, applied research in science and engineering, **H. Darjazi**, S.S. Hosseiny Davarani, H.R. Moazami, 11 March 2015, Tehran, Iran (**Poster**).
- Synthesis of nano zinc oxide by anodic dissolution method, M. Amiri, S.S. Hosseiny Davarani, H.R. Moazami, **H. Darjazi**, F. Tabatabaei, Eleventh annual seminar electrochemistry Iran, 18 November 2015, Tehran, Iran (**Poster**).

## Publications

- Sustainable Anodes for Lithium-and Sodium-Ion Batteries Based on Coffee Ground-Derived Hard Carbon and Green Binders, **H. Darjazi**, A. Staffolani, L. Sbrascini, L. Bottoni, R. Tossici, F. Nobili, J. Energies, 2020, 13(23), 6216; <https://doi.org/10.3390/en13236216>.
- Improvement of NMC layered cathode materials by combined doping/coating and evaluation of electronic-ionic transport properties by electrochemical impedance spectroscopy. **H. Darjazi**, S. J. Rezvani, S. Brutti, F. Nobili, *submitted to Electrochimica Acta*.
- Fe<sub>3</sub>O<sub>4</sub>/Graphene Composite Anode Material for Fast-Charging Li-ion Batteries, A. Staffolani, **H. Darjazi**, G. Carbonari, F. Maroni, S. Gabrielli, F. Nobili, Molecules 2021, **26**(14), 4316; <https://doi.org/10.3390/molecules26144316>.
- Impact of nitrogen doping on LiNi<sub>0.5</sub>Mn<sub>1.5</sub>O<sub>4</sub> sputtered thin films as high voltage cathode materials for Li-ion batteries, **H. Darjazi**, E. Gonzalo, M. Zarrabeitia, B. Acebedo, R. Cid, I. Madinabeitia, M.Á. Muñoz-Márquez, F. Nobili, *Under submission*.
- Cathodic electrosynthesis of ZnMn<sub>2</sub>O<sub>4</sub>/Mn<sub>3</sub>O<sub>4</sub> composite nanostructures for high performance supercapacitor applications, B. Ameri, S.S. Hosseiny Davarani, H.R. Moazami, **H. Darjazi**, J. Alloys and Compounds, 2017, 720 (5), 408-416; <https://doi.org/10.1016/j.jallcom.2017.05.271>.
- Evaluation of Charge Storage Ability of Chrome Doped Mn<sub>2</sub>O<sub>3</sub> Nanostructures Derived by Cathodic Electrodeposition, **H. Darjazi**, S.S. Hosseiny Davarani, H.R. Moazami, T. Yousefi, F. Tabatabaei, J. Progress in Natural Science: Materials International, 2016, 26(6), 523-527, <https://doi.org/10.1016/j.pnsc.2016.09.006>.
- Iron mediated cathodic electrosynthesis of hausmannite nanoparticles, H.R. Moazami, S.S. Hosseiny Davarani, T. Yousefi, **H. Darjazi**, J. Materials Science in Semiconductor Processing, 2015, 38, 240-248, <https://doi.org/10.1016/j.mssp.2015.04.035>.

## Teaching Experiences

### Co-supervisor activities

- Leonardo Sbrascini, 2018/2019, Master thesis: Advanced anode materials for Li-ion and Na-ion batteries: Synthesis and Characterization.

- Daniel Dawson, 2018/2019, Master thesis: Binders effect on Hard Carbons as anode materials for Li /Na-ion batteries.
- Luca Bottoni, 2018, Master thesis: Biomass-derived Hard Carbons as anode materials for Li-ion and Na-ion batteries.
- Francesca Stella, 2020, Bachelor thesis: Sintesi e Caratterizzazione di Anodi Carboniosi e a Conversione per batterie Li-ione e Na-ione.
- Maddalena Barcaioni, 2020 /2021, Bachelor thesis, Applicazioni half-cell e full-cell di batterie Na-ione basate su  $\text{Na}_{2/3}\text{Mn}_{0.8}\text{Fe}_{0.1}\text{Ti}_{0.1}\text{O}_2$  e hard carbon derivato dal mango.

### Teaching Activities

- Energy storage and production, April 2019, University of Camerino, Italy.
- Physical Chemistry Laboratory 1, December 2019, 18 hours, University of Camerino, Italy.
- Physical Chemistry Laboratory 1, January 2019, 10 hours, University of Camerino, Italy.
- Mathematic to undergraduate and high school students, 2009-2015

### Trainings

- International spring school of electrochemistry (ISSE) 2019 -Smart material for and from electrochemistry, May 2019, Castellammare del Golfo, Italy.
- Tutorials about Rietveld refinement via FullProf, February 2020, CIC Energigune, Spain.
- New Electrochemical Methods Using Potentiostat, Galvanosta Instrument n BDD Electrodes Applications and Batteries Design and Tests, and Why Corrosion should be Investigated by Electrochemistry, August 2016, Sharif University, Tehran, Iran.
- Electrochemical tests with Orignalys Potentiostat, Galvanostat and Working with Origa Master Software, Sarmad Teb Co. Laboratory, September 2016, Tehran, Iran.
- New Developments in HPLC and IC, August 2016, Sharif University, Tehran, Iran.

### Competences

#### Experimental techniques

##### Synthesis methods

- Sol-gel method
- Electrodeposition
- Solid-state method
- Sputtering method

##### Structural and morphology characterization

- X-ray diffraction (XRD)
- Fourier transform infrared spectroscopy (FTIR)
- Raman Spectra

- Thermogravimetric analysis (TGA)
- Inductively coupled plasma (ICP)
- Scanning electron Microscopy (SEM)

#### Electrochemical characterization

- Cyclic voltammetry
- Galvanostatic measurements
- Electrochemical impedance spectroscopy (EIS)

#### Software skills

- Rietveld method (FullProf, Maud)
- Electrochemistry (EC-lab, MIMS)
- Impedance spectrum analysis (Boukamp, EC-Lab, RelaxIS)
- High Score Plus, Xpert
- Matlab
- Blender
- Gwyddion
- Origin

### Awards

- Best student in MSc course (Achieved the highest GPA among all students).
- Ranked at position 1 in the MSc among 40 researchers.
- Best student in university in 2013-2014.
- Ranked 208<sup>th</sup> among more than 18000 participants in the national entrance exam for graduate school (M.Sc.)
- Ranked at position 4 among 63 students in BSc.
- Best student in High School Diploma (Achieved the highest GPA among all students).
- Best poster in 6th Scientific Day della Scuola di Scienze e Tecnologie, 2018, Camerino, Italy.