Ananya Maddegalla, Ph.D. Graduate in Chemistry

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Summary

I have 5 years of experience in battery electrochemistry, specializing in Electrolyte formulation and designing anion and cation specific ionic electroactive species and evaluating their role in improving the electrolyte performance of ethereal Mg complex solutions for smooth Mg reversibility and utilization for high energy density cathode materials in Rechargeable Magnesium-ion batteries. I'm an expert DOE, testing, and analyzing cell performance for Magnesium anode, cathode, and non-aqueous Mg electrolyte chemistries for Rechargeable Mg batteries as part of my Ph.D thesis. Additionally, I have experience in Li-ion and Na-ion batteries beyond my Ph.D. thesis work. I am an expert in pre- and post-physical, chemical data characterization, electrode fabrication, and validation of material performance for coin cell and 3-electrode cell systems.

Education

Bar-Ilan University (BIU), Israel (2018-2023)
Ph.D. in Chemistry
Thesis advisor: Assoc. Prof. Malachi Noked
Thesis: Anode and Electrolytes for Rechargeable Magnesium Batteries.

Indian Institute of Science (IISc), India (2013-2018)
M.Sc. in Chemistry
B.Sc.(R) in Chemistry and Materials Science

Skills & Abilities

- ***Battery Fabrication*:** Biologic- VSP-300, BCS, VSP, Neware, and Palmsens Electrochemical testing, Three-electrode Cell and Coin Cell Fabrication. **(Expert)**
- ***Electrochemical Techniques:*** LSV, CV, Karl Fisher titration and ionic conductivity measurements for novel electrolytes, EIS, CP, CA, GPCL, GITT, Rate performance, dQ/dV, half cell 3-electrode and full cell coin cell studies **(Expert)**
- ***Lab equipment*:** Glovebox maintenance and operation, electrode fabrication processes; slurry formulation and mixing, coating, drying, and calendaring, vacuum line and Schlenk line synthesis, High Temp. Furnace Hydrothermal and solid-state synthesis, pellet die hydraulic press, Atomic Layer Deposition (ALD). **(Expert)**
- ***Instrumentation Techniques*:** Cross-sectional TEMs analysis, certified SEM, HR-SEM and EDAX operator, Cross-sectional FIB analysis, Powder X-ray Diffraction (XRD), X-ray Fluorescence (XRF), Inductively-coupled plasma mass spectrometry (ICP-MS), Single Crystal-XRD, multi-NMR spectroscopy specialist, UV-Vis-IR spectroscopy, X-ray Photoelectric spectroscopy, Raman Spectroscopy. **(Expert)**

- ***Digital Skills:*** Microsoft Office | EC-LAB | PalmSens4 | Neware BTS | Top-spin | Origin Data Analysis and Graphing Software – OriginLab graphics | Software for Chemistry (TopSpin, Olex, Chemdraw) | X'pert HighScore (X-ray analysis) | XPS peak fitting (XPSPEAK4.1) | Atomic Layer Deposition (ALD) **(Expert)**

Experience

PH.D. GRADUATE IN CHEMISTRY| ELECTROCHEMISTRY | OCTOBER 2018- OCTOBER 2023.

Ph.D. Thesis: Magnesium Alloy Anode and Crystallized Organo-Halo Aluminate Magnesium Electrolyte solutions for Rechargeable Magnesium-Ion batteries.

Leading development of electrodes (anode and cathode) and electrolyte formulation in rechargeable magnesium-ion batteries for next-generation EVs.

- Led, developed, DOE of protective layer coating via atomic layer deposition (ALD) on current collectors for rechargeable Mg batteries. (Manuscript under preparation)
- DOE and chemical and analytical investigation on the effect of polydentate ethers on the structure and electrochemistry of bridge magnesium phenyl aluminates. The novel approach for synthesis of the $MgCl^{+}$ and Mg^{2+} cationic electrolytes. (Manuscript under preparation)
- Led, developed, optimized DOE of various organometallic complex Mg electrolyte formulation to investigate the key factor effecting electrochemical Mg stripping/plating and widening the electrochemical window and reversibility, and validating cell performance using Chevrel phase cathode in Mg ion batteries. (Electrochimia Acta, 2023, https://doi.org/10.1016/j.electacta.2023.142869)
- Led role in designing, synthesizing and evaluation of electrolyte structure and electrochemical response in ethereal solvents for Mg electrolytes. (Electrochimia Acta, 2023, https://doi.org/10.1016/j.electacta.2023.142413)
- Investigated and evaluated the electrolyte-electrode surface interface due to corrosion in current collectors in Mg electrolytes. (J. Electrochemical Soc., 2021, https://doi.org/10.1149/1945-7111/ac1cc8)
- Led role in evaluating, electrochemical and analytical testing, and validating performance and feasibility of thin film alloy Mg anodes as a potential candidate for replacement of Mg metal anode for Mg-ion batteries.(ChemSusChem, 2021, https://doi.org/10.1002/cssc.202101323)

M.SC IN CHEMISTRY| MATERIAL RESEARCH CENTRE (MRC), IISC, INIDA.

Graduate research intern for developing Metal-Organic Frameworks (MOF) as electrocatalyst for overall water splitting. (May 2017-May 2018)

- I joined Prof. K.K. Nanda group, in MRC department at IISc, to work on my master thesis to develop and design metal organic framework s (MOF) using solid state and hydrothermal syntheis.
- I started my thesis work by designing, synthesizing and later evaluating optical and physical properties of MOF/Metalloprotein hybrid derived carbon nanotubes under the guidance of Ph.D. graduate student of Prof Nanda.
- My role included data acquisition and evaluation of electrocatalysts for oxygen evolution/reduction and hydrogen evolution reactions.
- Documentation of my research output including analysis and interpretation of all data, maintaining records and databases, and drafting technical/progress reports for master's dissertation.

B.SC (RESEARCH) IN CHEMISTRY AND MATERIAL SCIENCE | MRC, IISC, INDIA.

Undergraduate research intern for developing carbon nanoparticles for various applications. (May 2014- March 2017)

- I joined Prof. K.K. Nanda group, in MRC department at IISc, to work on my bachelor's thesis to develop and design and synthesis 0-D and 1-D carbon nanoparticles via hydrothermal synthesis technique .
- I participated in synthesis and characterization optical and physical properties of carbon nanoparticles. (New Journal of Chemistry, 2017, https://doi.org/10.1039/C7NJ02901B).
- My roles included contributing to data acquisition and evaluation for detection of copper trace metal-ion and bioimaging application.
- As an undergraduate intern I documented my research outputs including physical and chemical characterization and interpretation of all data, maintaining records and databases for my undergraduate thesis.

Accolades

- Member of **European Magnesium Interactive Battery Community (E-Magic).** 1 Jan 2019 – Present.
- Recipient of **Milgat Hanasi, Presidential Scholarship for doctoral students** at Bar-Ilan University, Israel. 2018 – Present.
- **Kishore Vigyanik Prothsahan Yojana (KVPY).** 2013-2018 All India Rank – 9. Scholarship Award for the students pursuing Bachelor's and Master of Science in India, funded by the Department of Science and Technology (DST), India.

Social Media

- https://www.linkedin.com/in/ananya-maddegalla-5b1582b9/
- https://scholar.google.com/citations?user=alQWAXUAAAAJ&hl=en
- https://www.researchgate.net/profile/Ananya-Maddegalla

Languages

- ENGLISH : Proficient
- HINDI : Proficient
- TELUGU : Mother tongue

References

- Assoc. Prof. Malachi Noked, Department of Chemistry, Bar-Ilan University, Israel. Malachi.Noked@biu.ac.il, https://scholar.google.com/citations?user=sjk0vNQAAAAJ&hl=en

- Prof. Doron Aurbach, Department of Chemistry, Bar-Ilan University, Israel. Doron.Aurbach@biu.ac.il, https://scholar.google.co.il/citations?user=IwxntTAAAAAJ&hl=en