SURYA MITRA AYALASOMAYAJULA

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Education

- Ph.D, Materials Engineering, Purdue University, West Lafayette, USA (Jan 2019 – Dec 2023).
- MS, Aeronautics and Astronautics, Purdue University, West Lafayette, USA (Aug 2016 – Dec 2018).
- B.Tech-M.Tech, Aerospace Engineering, Indian Institute of Technology (IIT), Kanpur, India (Aug 2011 – July 2016).

Research Experience

Oak Ridge National Lab — Oak Ridge, TN
Postdoctoral Research Associate — *Jan 2024–*

- Development of physics informed data driven models for large scale electrochemical storage applications.

Purdue University — West Lafayette, IN
Advisor: Prof. R. Edwin García — *Jan 2019 – Dec 2023*

- Physics-based reduced-order modeling of Degradation in lithium ion batteries.
- Analytical design of electrode particles debonding.
- Porous electrode theory (PET) electrochemical modeling, and data analytics of battery electrode microstructural parameters of lithium ion batteries.

Purdue University — West Lafayette, IN
Advisors: Prof. Sergey Macheret and Prof. Jonathan Poggie — *Aug 2016 – Dec 2018*

- Two-Dimensional Modeling of Discharge Sustained by Repetitive Nanosecond Pulses.

Indian Institute of Technology, Kanpur — India
Advisor: Prof. E Rathakrishnan — *Dec 2014 – July 2016*

- Experimental design of flow control methods, and analysis of mixing characteristics of cold air jets.

Publications

1. "Analytical Design of Electrode Particle Debonding for Battery Applications" **A. Surya Mitra**, Abraham Anapolsky, R. Edwin García, *Modelling and Simulation in Materials Science and Engineering* 32, no. 6: 065031 (2024).
2. "Performance benchmarks for open source porous electrode theory models." **A. Surya Mitra**, Daniel Cogswell, Debbie Zhuang, R. Edwin García, *Heliyon* 10, no. 7 (2024).

3. "SEI-Coated Carbon Particles: Electrochemomechanical Fracture Mechanisms." Alfredo Sanjuan, **A. Surya Mitra**, R. Edwin García, *Journal of The Electrochemical Society* 171, no. 2: 020529 (2024).

4. "Data-driven autoencoder neural network for onboard BMS Lithium-ion battery degradation prediction." Meghana Sudarshan, Alexey Serov, Casey Jones, **Surya Mitra Ayalasomayajula**, R. Edwin García, Vikas Tomar, *Journal of Energy Storage* 82: 110575 (2024).

5. "Physics-based, reduced order degradation model of lithium-ion batteries" Jana, Aniruddha, **A. Surya Mitra**, Supratim Das, William C. Chueh, Martin Z. Bazant, and R. Edwin García, *Journal of Power Sources*, 545, 231900 (2022).

6. "Artificial intelligence inferred microstructural properties from voltage–capacity curves" Yixuan Sun, **Surya Mitra Ayalasomayajula**, Abhas Deva, Guang Lin, and R. Edwin García, *Scientific Reports*, 12(1), pp.1-11, 2022.

7. "Empirical scaling analysis of supersonic jet control using steady fluidic injection" P. Arun Kumar, S. M. Aravind Kumar, **A. Surya Mitra**, E. Rathakrishnan, *Physics of Fluids*, 31(5), 056107 (2019); `https://doi.org/10.1063/1.5096389.`

8. "Fluidic injectors for supersonic jet control" P. Arun Kumar, S. M. Aravind Kumar, **A. Surya Mitra**, E. Rathakrishnan, *Physics of Fluids*, 30(12), 126101 (2018); `https://doi.org/10.1063/1.5056209`

9. "Boundary Layer Effect on Jet Control Effectiveness" **A. Surya Mitra**, A. Manideep, E. Rathakrishnan, *Applied Mechanics and Materials*, Vol. 743, pp 537-544, (2015).

Articles In Preparation

10. " A Computational Study to Extend the Megapack Battery Cycle Life By Different Balancing Strategies" **A. Surya Mitra**, Yuliya Preger, Srikanth Allu, (In Preparation 2024).

Conference Contributions

1. **Surya Mitra Ayalasomayajula**, Srikanth Allu, "Impact of Megapack Battery Cycle Life by Different Balancing Strategies", OE peer review, 2024, Seattle, WA. (Presentation)

2. Aniruddha Jana, **A Surya Mitra**, P. Attia, William C. Chueh, R Edwin García, "Physics Based Reduced Order models for Degradation mechanisms in Lithium-Ion Batteries", Toyota Research Institute Accelerated Materials Design and Discovery (AMDD) Workshop and Conference, 2019, Boston, MA. (Poster presentation)

Softwares and Repositories

1. Aniruddha Jana, Surya Mitra Ayalasomayajula, R. Edwin García, "romdegradation: Physics-based, Reduced Order Degradation Model of Lithium-ion Batteries", `https://nanohub.org/resources/romdegradation`. (DOI: 10.21981/KGET-D846), 2020

2. **A. Surya Mitra**, J. Lund, A. Bartol, D. R. Ely, R. Edwin García, "VKML: Virtual Kinetics of Materials Laboratory", `https://github.itap.purdue.edu/garciagroup/VKML` February 2021

3. L. D. Robinson, **A. Surya Mitra**, A. Deva, R. E. García. "dualfoil.py: A Python User Interface for dualfoil", `https://github.itap.purdue.edu/garciagroup/dualfoil.py`, December 2023.

4. **A. Surya Mitra**, Daniel Cogswell, R. Edwin García. "mpetUI: User Interface for MPET", `https://github.itap.purdue.edu/garciagroup/mpetUI`, December 2023.

5. **A. Surya Mitra**, R. Edwin García. "bat2bat: Porous electrode theory model (PET) input file converter", `https://github.itap.purdue.edu/garciagroup/bat2bat`, January 2024.

In Development

6. "liionpack", `https://code.ornl.gov/EnergyStorage/liionpack`, 2024

Technical Skills

- **Programming:** Python, MATLAB, Fortran
- **Softwares:** Simulink, AutoCAD, Inventor, Abaqus, LabVIEW
- **Modeling and Areas of expertise:** Electrochemistry, Multiphysical degradation in lithium ion batteries, Scaling methods in porous media, Statistical methods, Finite element /volume methods, Continuum mechanics (solid and fluid mechanics), Thermodynamics, Reactive flows (plasma modeling), Magneto hydrodynamics, and High-temperature gas dynamics