

Hemanth N R

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MOTIVATION

I am determined to work towards a greener environment by developing advanced batteries and the challenges of achieving economical and efficient electric vehicles. My objective is to become an entrepreneur and a leading researcher in electrochemistry, and solve a part of the problem in mitigating the effects of climate change.

EDUCATION

University of Washington, Seattle
MS in Materials Science and Engineering
Advisor: Prof. Guozhong Cao

2022 - present
GPA: 3.78/4.0

National Institute of Technology Karnataka, Surathkal
B.Tech in Metallurgical and Materials Engineering
Advisor: Prof. K Narayan Prabhu

2017 - 2021
GPA: 8.08/10

Theses: Characterization of Paraffin Wax for Microelectronics and Thermal Energy Storage Applications.

SUMMARY OF QUALIFICATIONS

- Expertise in the fabrication of 18650, 21700, coin cells and split cell systems for lithium-ion batteries (LIBs) and super-capacitors, from concept to completion.
- Process optimization, materials selection and battery testing interference for cyclic studies.
- Work experience in a dry room (at 1% and 10% relative humidity) at pilot plant with glovebox, continuous coating, winding & calendaring processing machines.
- Strong research background in energy storage materials, as well as polished writing and presentation skills.

RELEVANT EXPERIENCE

Sol-gel Research Group, University of Washington
Graduate Student Researcher

September 2022 - present

- Examining the effect of temperature on LIB's degradation for freight trucks (PACCAR).
- Developing experimental and data-driven life-cycle prediction tool for LIBs.
- Interpreting cycle life of LIBs and correlating with drive cycle of EVs.

Remote Research Collaboration

April 2020 - present

Funding: Department of Science and Technology under India-Korea bilateral project & NRF-Korea

Advisors: Dr. Nitin K Chaudhari & Prof. Kwangyeol Lee

- Collaborated with researchers from Pandit Deendayal Energy University, Korea University and the University of British-Columbia in interdisciplinary project grants.
- Evaluated and published articles on the performance metrics of MXene materials and their heterostructures for energy storage and neuromorphic computing applications.

Log9 Materials

November 2021 - June 2022

Chief of Climate Action and Materials & Electrochemistry Intern

- Identified the degradation mechanism in 3V and 2.7V super-capacitors using a three-electrode split cell system.
- Achieved benchmark performance in 2.7V 18650 and coin cells super-capacitors by investigating different electrolytes.
- Developed the one-pot synthesis process to prepare an aqueous lithium-titanate anode slurry for LIBs.
- Analyzed, interpreted & presented the cyclers data of LIBs and super-capacitors in weekly team meetings.

- Reviewed & published article on developments in MXene materials for energy applications.
- Assisted PhD students in drafting & editing articles on polymers for electronics & super-capacitor applications.
- Acquired laboratory skills & working principles of characterization tools such as viscometer, UV/VIS spectrometer, electro-spinning setup, single and twin-screw extruder, probe sonicator, contact angle goniometer and melt flow indexer.

PUBLICATIONS

Book Chapters

* - equal contribution

1. **MXene-transition metal compound sulfide and phosphide hetero-nanostructures for photo-electrochemical water splitting in Solar-Driven Green Hydrogen Generation and Storage**
Ranjit Mohili, **N R Hemanth**, Kwangyeol Lee and Nitin K Chaudhari.
(in press), 2023.

Journal Publications

7. **Emerging High Entropy Metal Sulphide and Phosphide for Electrochemical Water Splitting**
Ranjit Mohili*, **N R Hemanth***, Haneul Jin*, Kwangyeol Lee and Nitin K Chaudhari.
(under review), 2023.
6. **MXenes: promising 2D memristor materials for neuromorphic computing components.**
Monika Patel, **N R Hemanth**, Jeny Gosai, Ranjit Mohili, Ankur Solanki, Mohendra Roy, Baizeng Fang and Nitin K Chaudhari.
Trends Chem. 4, 835–849 (2022). DOI: 10.1016/j.trechm.2022.06.004 IF - 22.4
5. **Metallic Nanosponges for Energy Storage and Conversion Applications.**
N R Hemanth*, Ranjit D Mohili*, Monika Patel, Arvind H Jadhav, Kwangyeol Lee and Nitin K Chaudhari.
J. Mater. Chem. A, 10, 14221–14246 (2022). DOI: 10.1039/d2ta02057b IF - 14.5
4. **Transition Metal Dichalcogenides decorated MXenes: Promising Hybrid Electrodes for Energy Storage and Conversion Applications.**
N R Hemanth*, Taekyung Kim*, Byeongyoon Kim*, Arvind H. Jadhav, Kwangyeol Lee and Nitin K. Chaudhari
Mater. Chem. Front., 5, 3298–3321 (2021). DOI: 10.1039/D1QM00035G IF - 7.7
3. **Recent advances in 2D MXenes for enhanced cation intercalation in energy harvesting Applications: A review.**
N R Hemanth and Kandasubramanian, B.
Chem. Eng. J. 392, 123678 (2020). DOI: 10.1016/j.cej.2019.123678 IF - 10.6
2. **Multifunctional conjugated 1,6-heptadiynes and its derivatives stimulated molecular electronics: Future moletronics.**
RaviPrakash Magisetty, **N R Hemanth**, Pawan Kumar, Anuj Shukla, Raja Shunmugam and Balasubramanian K.
Eur. Polym. J. 124, 109467 (2020). DOI: 10.1016/j.eurpolymj.2019.109467 IF - 4.3
1. **Poly(1,6-heptadiyne)/NiFe₂O₄ composite as capacitor for miniaturized electronics.**
RaviPrakash Magisetty, **N R Hemanth**, Anuj Shukla, Raja Shunmugam, Balasubramanian K.
Polymer-Plastics Technology and Materials, 59:18, 2018–2026 (2020). DOI: 10.1080/25740881.2020.1784217

RESPONSIBILITIES

- **Graduate Chemistry Tutor** - STARS program, University of Washington February 2023 - present
 - Teach Chemistry 142 and Chemistry 152 for ~ 30 students.
 - Mentor highly motivated Washington state residents from low-income backgrounds & under-deserved high schools to graduate with degrees in engineering and computer science.
- **Vice-Captain Operations & Brake Systems Head** - Baja NITK Racing, Baja SAE India, NITK 2018 - 2021
 - Administered and designed the braking system of an all-terrain vehicle per the Baja SAE rulebook
 - Strengthened the operational strategies by forecasting budget and secured INR 3.5 lakhs funding

- Secured 1st place in marketing presentation out of 80+ teams at Baja SAE India 2018, IIT Ropar
- Ranked 11th in overall static events and 4th in cost report out of 150+ teams in Baja SAE India 2021
- Ranked 1st in B-plan and overall 2nd in the ATVC virtual championship 2021

- *Class Representative, Metallurgical and Materials Engineering, NITK Students Council* *2019 - 2021*
 - Spearheaded a class of 50 students at different levels of the student body and competitions
 - Proposed and implemented a revised course plan to improve cohesive learning and teaching methods
- *Joint Convener, Incident 2019 NITK* *2018 - 2019*
 - Organized student participation in the five-day annual cultural festival attended by ~ 8000 people

COURSEWORK ---

- Imaging at nanoscale and atomic scale, nanostructures and nanomaterials (thin-films, chemical/physical vapor deposition, lithography, spectroscopy), defects in materials, electron theory of materials.

TECHNICAL SKILLS ---

- *Engineering skills:* Non-destructive testing, MIG welding, Failure analysis & Metallographic examination.
- *Computer skills:* VESTA, Python, Neware battery cycler, BioLogic, Catia, MS Office, Origin pro & C.