Mihit H. Parekh

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EDUCATION

Purdue University, West Lafayette, IN, USA **Aug 2017 – Oct 2021**
Doctor of Philosophy, Chemical Engineering

Institute of Chemical Technology (Formerly UDCT), Mumbai, India **Aug 2011 – May 2015**
Bachelor of Chemical Engineering

EXPERIENCE

Principal Process Engineer, Enovix Corporation, USA **Nov 2021 – Present**

- Developing the next generation lithium-ion batteries with 100% active silicon anodes

Graduate Research Assistant, Purdue University **Aug 2017 – Oct 2021**
Research advisor: **Prof. Vilas G. Pol**
Research Projects: Novel Architecture for Lithium-ion Batteries (LIBs), Advanced LIBs Anodes, Thermal safety studies, In situ temperature monitoring, Recycling and Upcycling LIBs, Solid State Batteries

- Devised new configuration of LIBs to mitigate solid electrolyte interface (SEI) lithium-ion losses for realizing longer-lasting batteries
- Synthesized and Characterized Silicon-Graphite Anode using high-temperature pyrolysis to encapsulate silicon nanoparticles for enhanced conductivity and accommodating the volumetric expansion of Si for enhanced electrochemical performance
- Characterized in situ development of silicon-graphite anode material using environmental transmission microscopy and evaluated the thermal safety aspects of the full cell via Multiple module calorimetry
- Developed an in situ thermal monitoring system for early detection, prediction, and prevention of thermal runaway situation by measuring electrode surface temperature
- Understanding the cell failure mechanism for polymer solid state electrolytes

Hybrid Electric Vehicle Optimizations, Purdue University, West Lafayette, USA **Jan 2019 – May 2019**

- Optimization of engine and battery to achieve higher mileage, Analyze acceleration characteristics of Toyota Prius, Understand simulation results for a variable drive, Develop a sophisticated model for predicting round trip efficiency

Assistant Manager, Hikal Ltd., India **July 2015 – May 2017**

- Reported to Technical Services Head, Vice President, Dr. Pramodchandra Sane
- Worked with Prof. Vivek Ranade, Queen's University, Belfast, and Prof. Amol Kulkarni, National Chemical Laboratories, Pune, India for conceptualizing the conversion of Hikal's Batch Processes to Continuous Processes using micro-reactor technology & Process Intensification.
- Developed Pharmaceutical product *Gabapentin* and Agro product *Diuron* into continuous processes by reducing residence time from 8-10 hours to few minutes with quality optimizations.

SKILLS

- Lithium-ion Batteries, Sodium-ion Batteries, Sonochemistry, Nanotechnology, Coin cells & Pouch Cell Fabrication, Organic synthesis, Analysis of Electrochemical techniques like Battery's charge-discharge cycling, Battery testing using multi-channels: ARBIN, MTI NEWARE, and LANHE systems
- **Equipment Handling & Repairs:** VAC-Atmosphere NEXUS II Glovebox, Thinky AR-100, Flactek DAC 1200-500, Instrument Specialists i1000 TGA, Anton Paar Ball Miller BM500
- **Characterizations:** Cyclic Voltammogram, Electrochemical Impedance Spectroscopy, Structural characterization (XRD, Raman, BET, FT-IR, CHNOS), Temperature programmed techniques (MMC, TGA, DSC), Electrochemical Analysis (CV, EIS), Field-emission-gun-scanning-electron-microscope (FESEM), Transmission-electron-microscope (TEM), Contact Angle measurement

PUBLICATIONS

1. M. H. Parekh, A. D. Sediako, A. Naseri, M. J. Thomson, V. G. Pol, *Adv. Energy Mater*. 1902799, **2019**, 1903690.
2. M. Palanisamy, M. H. Parekh, V. G. Pol, *Adv. Functional Mater*. 2003668 **2020**.
3. M. H. Parekh, V. P. Parikh, P. J. Kim, S. Misra, Z. Qi, H. Wang, V. G. Pol, *Carbon*, **2019**, 148, 36-43.
4. M. H. Parekh, B. Li, M. Palanisamy, T. E. Adams, V. Tomar, V. G. Pol, *ACS Appl. Energy Mater*. **2020**, 3, 8, 7997-8008.
5. B. Li, M. H. Parekh, R. A. Adams, T. E. Adams, C. Love, V. G. Pol, V. Tomar, *Scientific Reports*, 2019, 9, 13255., **2019**, 1903690.
6. V. P. Parikh, A. Ahmadi, M. H Parekh, F. Sadeghi, V. G. Pol, *Environ. Sci. Technol*., **2019**, 53, 3757−3763.
7. M. Palanisamy, V. P. Parikh, M. H. Parekh, V. G. Pol, *Energy Technology*, **2020**, 2000094.
8. M. N. Carter, M. H. Parekh*, V. Tomar, E. Dietz, V. G. Pol, *Applied Clay Science*, 208, **2021**, 106111.
9. B. Li, M. H. Parekh, V.G. Pol, T. E. Adams, J. Fleetwood, C.M. Jones, V. Tomar, *Energy Technology*, **2021**, 2100497.
10. A.R. Shekhar, M.H. Parekh*, V.G. Pol*, *Journal of Power Sources*, **2022**, 523, 231015.
11. M.H.Parekh, S. Oka, J. Lutekhaus, V.G. Pol, "Critical-point Dried, Porous and Safer Aramid Nanofiber Separator 2 for High-Performance Durable Lithium-ion Batteries", ACS Applied Materials & Interfaces *(In Press)*.

Submitted

12. M. H. Parekh, M. Palanisamy, V. G. Pol, "Reserve Lithium-ion Batteries: Deciphering in situ lithiation of Lithium-ion free Vanadium Pentoxide Cathode with Graphitic Anode"
13. M.H. Parekh, D.A. Jokhakar, V.P. Parikh, M. Palanisamy, V.G. Pol, "Polysulfides mitigation through tailored separator for critical temperature energy dense, lithium sulfur batteries."
14. E. Adams, M.H. Parekh, D. Gribble; T. Adams, V.G. Pol, "Reduced Desolvation Energy Ternary Fluorinated Electrolyte for Enhanced Subzero Temperature Performance of Lithium-ion Batteries".

In Preparation

15. H. Rao, M.H. Parekh, D. Jokhakar, V.G. Pol, "Heteroatoms Embedded Carbon Anode for Sodium-ion Batteries at Elevated Temperature"
16. J. Li, M.H. Parekh, D. Puthuserri, V.G. Pol, S. Kenneth, "Silicon-Carbon Composite Anodes using Papilionoidea's Neuroptera Templates"

BATTERY INDUSTRIAL COLLABORATIONS

1. **BrightVolt Inc.** – Development of their polymer solid state electrolyte at Purdue University
2. **Battery Innovation Center** – Scale up ViPER Laboratories technologies at BIC, Indiana
3. **Valgotech Inc.** – Development of lithium-sulfur batteries for extreme temperature conditions at Purdue University

PATENTS

4. **US Patent Application #20210057786** – Li-ion Battery Safety by Prevention, Detection, and Control
5. **US Patent Application #20210013555**– Lithium Replenishing Rechargeable Batteries
6. PRF Matter No.: **69311**– Lithium-Sulfur Batteries for Extreme Conditions– Provisional

CONFERENCE PRESENTATIONS

1. M. H. Parekh, M. Palanisamy, V. G. Pol, "Multifunctional Trilayer Separator for High-Performance Lithium-Sulfur Batteries under Extreme Conditions", 2021 239th ECS Meetings, Chicago.
2. M. H. Parekh, M. Palanisamy, V. G. Pol, "Reserved Lithium-ion Batteries for in situ Lithiation of Vanadium Pentoxide Cathode", 2021 239th ECS Meetings, Chicago.
3. M. H. Parekh, M. Palanisamy, V. G. Pol, "In Operando Lithiation of Lithium Free Cathodes", 2020 ECS Prime, Hawaii.
4. M. H. Parekh, B. Li, M. Palanisamy, T. E. Adams, V. Tomar, V. G. Pol, "In Situ Detecting Lithium-Ion Batteries Thermal Runaway with Resistance Temperature Detector", 2020 ECS Prime, Hawaii.
5. B. Li, M. H. Parekh, V. G. Pol, V. Tomar "In-situ Electrode Temperature Monitoring and Thermal Runaway Detection of Li-ion Pouch Cell", 2021 TMS Annual Meeting & Exhibition, Orlando, Florida
6. M. H. Parekh, A. D. Sediako, A Naseri, M. J. Thomson, V. G. Pol, "Mechanistic Elucidation and Electrochemical Performance of Amorphous Carbon Interfaced Graphite-Silicon Advanced Anodes", AIChE Annual Meeting, 2019, Orlando, Florida.

7. M. H. Parekh, B. Li, V. Tomar, V. P. Pol, "A Critical Evaluation of Internal Temperature Sensors Implanted in the Lithium-ion Batteries", 2020 TMS Annual Meeting & Exhibition, San Diego, California

AWARDS, HONORS & MEMBERSHIP

- Enovix Corp. Quality Contest **2022**
- Purdue Chemical Engineering Most Citation Award (Ad. Energy Mater. Publication) **2022**
- Purdue Chemical Engineering Most Citation Award (Carbon Publication) **2021**
- Ryland Travel Award **2021**
- K. M. Abraham Travel Award by The Electrochemical Society (ECS) Battery Division **2020**
- 2020 ChE Excellence in Safety Award Link **2020**
- Purdue Chemical Engineering Travel Grant **2019**
- Member, School of Chemical Engineering Safety Committee, Purdue University **2019 - 2022**
- Member, The Electrochemical Society **2020 – 2022**
- Member, American Institute of Chemical Engineers **2019 – 2021**
- Safety Officer, Vilas Pol Energy Research (ViPER) Group, Purdue University **2018 - 2019**

LEADERSHIP & PROFESSIONAL SERVICE

Safety Officer for Davidson School of Chemical Engineering **Aug 2019 – August 2022**

- Planning, execution of safety regulations, norms & policies for the School
- Communicated new safety policies/recommendations to the group and reported near-miss/ safety incidents to the committee

Graduate Student Organization (GSO) Officer, Purdue University **May 2018 – May 2019**

- Planned and organized events to promote sustainable practices like tree plantation drive, cloth collection drive, wind farm tour, etc
- Served as a key member in planning, organizing, and executing annual research symposium (50+ attendees)

Teaching Assistant (TA) for CHE45000 Senior Design Lab and CHE43500 Chemical Engineering Laboratory

OTHER EXPERIENCES

Research Intern, Deepak Nitrite Ltd., Gujarat **May 2014 – June 2014**

- Underwent In-Plant Training on the separation of ortho & para - Nitrotoluenes using Distillation and Crystallization.
- Developed Visual Basic program for the company on Distillation.

Senior Design Project, Institute of Chemical Technology, Mumbai, India **July 2014 – May 2015**

Project: Techno-economic feasibility report to produce 10,000 tons per annum of Sodium Selenite

- Generated a detailed project proposal including chemical process selection, mass and energy balance, process flow diagram, process design, reactor design, equipment sizing, utility operations, and project economics.

Summer-Research Project, Institute of Chemical Technology, Mumbai, India **May 2013 – July 2013**

- Studied different properties of various surfactants & ink and studied Vapor Absorption Machine, working with solar panels

PORTFOLIO

https://parekhmihit.wixsite.com/2021