

INDIAN • Apr 23, 1997
Redtenbacherstrasse 32c, Pforzheim 75177 • +4915906158023
challuriakhilkumar@gmail.com • <https://www.linkedin.com/in/akhilchalluri>

PhD-level Battery Systems Engineer specializing in Redox Flow Batteries and grid-scale energy storage. Unique cross-functional expertise spanning long-term cell testing, degradation analysis, advanced electrode fabrication (dry-coating/compression molding), automated test stand integration (PLC/BaSyTec), and Techno-Economic Analysis. Passionate about driving CapEx/OpEx reductions and translating lab-scale chemistry into commercially viable, megawatt-scale hardware

Jan 2023 - Present	PhD Researcher Fraunhofer Institute for Chemical Technology, Pfinztal, Germany Pfinztal, Baden-Württemberg - Investigate cycling behavior to enhance Iron/Iron Redox Flow Battery efficiency. - Develop electrodes to improve battery performance and durability. - Optimize system parameters for scalable energy storage solutions. - Apply advanced electrochemical techniques to analyze battery processes. - Conducted advanced experimental research and data analysis to drive innovation in chemical technology at the Fraunhofer Institute for Chemical Technology. - Designed and executed complex laboratory experiments to investigate novel chemical processes, enhancing project outcomes and scientific understanding. - Collaborated with interdisciplinary teams to develop and optimize sustainable chemical technologies, contributing to multiple peer-reviewed publications.
Feb 2022 - Jan 2023	Student Research Assistant Fraunhofer Institute for Chemical Technology, Pfinztal, Germany Pfinztal, Baden-Württemberg
Jun 2021 - Dec 2021	Battery Development Intern BMW Group Munich, Bavaria, Germany - Analyzed cyclic and calendar aging data using KeySight ESD and Matlab tools. - Handled single layer pouch cells for various battery testing objectives. - Collaborated with fast charging team to support battery development projects. - Utilized cell holders to conduct precise battery performance tests.
Jun 2017 - Aug 2017	Intern in Chemical Engineering Group NIT nagpur Nagpur, Maharashtra, India I have done a project in National Institute of Technology - Nagpur India, under the guidance of Professor Dr.RAVI MATHEKAR on Three way catalytic converter in chemical and automotive field.
Jan 2018 - Jul 2018	Student Research Assistant (Bachelors) National United University, Miaoli, Taiwan, Taiwan Miaoli, Taiwan I worked on catalyst formation, focusing on the integration of both the positive and negative reactions for Zinc Air Flow Batteries, under the guidance of Prof. Kan-Lin Hsu in the Energy Engineering Department. Additionally, I collaborated on high-storage batteries utilizing vanadium, guided by Dr. Cian Tong Lu at National United University.

Oct 2023 - Present	Doctor of Philosophy-PhD , Chemical Engineering
Jan 2019 - Dec 2022	Karlsruhe Institute of Technology KIT Karlsruhe, Germany Masters , Chemical and Energy Engineering
Jan 2014 - Dec 2018	Guericke University Bachelor of Technology-BTech , Mechanical Engineering
	Vel Tech Rangarajan Dr. Sagunthala R & D Institute of Science and Technology

RedoxFlowBatteries | ElectrochemicalDiagnostics | DegradationAnalysis | TechnologyScaleUp | ThermalManagement | ElectrodeFabrication | TestAutomation | PythonProgramming | TechnoEconomicAnalysis

GERMAN Intermediate
ENGLISH Advanced
HINDI Advanced
TELUGU Native

- Development of a Fully Automated Organic Redox Flow Battery System at kW scale for an Industry.
- Ultra Thin Flow - Development of ultra-thin redox flow cells with ingenious flow technology (UTF)
- Comprehensive Study of Iron/Iron Redox Flow Batteries for Grid-Level Energy Storage
- 1. **Material Development:** Engineered and fabricated low-cost, hot-pressed composite electrodes and bipolar plates, successfully replacing expensive graphitic plates and carbon felt to reduce overall cell CapEx.
- 2. **Thermal & Electrochemical Optimization:** Mapped system performance across 20 °C to 50 °C limits, establishing a 40 °C thermal protocol and a 20 °C "soft-start" method that mitigates passivation and boosts energy efficiency.
- 3. **System Architecture:** Optimized hydrogen stoichiometry and mass transport for a Recombination Cell (RC), drastically shrinking the required auxiliary stack size to under 10% of the main battery footprint.
- 4. **Automated Validation:** Integrated BaSyTec cyclers with Siemens LOGO! PLCs for operando sensor tracking (pH, temperature) to execute long-term aging tests (>560 cycles) and dynamic constant-power grid simulations.
- 5. **Commercial Scale-Up:** Developed a comprehensive Techno-Economic Analysis (TEA) for a 10 kW / 40 kWh module to translate lab-scale material and architectural improvements into direct Levelized Cost of Storage (LCOS) reductions.
- Techno-economic analysis of hydrogen bromine redox flow batteries - MELODY
- Computational Fluid Dynamics Simulation around a motorcycle helmet
- Experimental analysis on different biomass electrolytes with vanadium and iron oxide solution using aeration and oxidation.
- Influence of capacity fading on Vanadium Redox Flow Battery.
- Zinc Air Flow Battery with different ductile structures for energy storage
- Design and Fabrication of Epicyclic Gear Train with optimal velocity ratio.

DAAD Research Fellow / Visiting Scholar Australian Institute for Bioengineering and Nanotechnology (AIBN), University of Queensland (Brisbane, Australia) [2026-2027]

- Awarded a highly competitive, fully funded grant from the German Academic Exchange Service (DAAD) to foster international collaboration in next-generation energy storage.
- Spearheaded specialized research on the development of Iron/Iron Redox Flow Batteries (IRFBs), bridging European grid-scale architectures with advanced Australian nanomaterial research.
- Investigated and developed novel mitigation strategies to suppress parasitic hydrogen evolution at the negative electrode, directly improving Coulombic efficiency and system lifespan.

- C. S. V. A. Kumar, J. Tübke, K. Pinkwart, and J. Noack, "A multi-parameter analysis of iron/iron redox flow batteries: effects of operating conditions on electrochemical performance," *Energy Advances*, vol. 4, pp. 1179-1200, Jul. 2025, doi: 10.1039/D5YA00139K.
- C.S.V.A.Kumar, Kan -Lin - Hseuh, "Kinetic Study of Oxidation Reaction of Ferrous Ion by Aeration for Direct Biomass Power Generation," presented at the 23rd National Conference of Taiwan on Vehicle Engineering, Dec. 1. 2018.

Dr.-Ing. Jens Noack
Applied Electrochemistry & Redox Flow Batteries
Fraunhofer Institute for Chemical Technology (ICT)
Adj. Assoc. Prof. (UNSW & UQ, Australia)
jens.noackict.fraunhofer.de
+49 (0) 721 4640 870

- International Flow Battery Forum (IFBF) Austria (2025) & Scotland (2024) Poster & Conference Papers
- 244th Electrochemical Society (ECS) Conference, Gothenburg, Sweden (Oct 2023) Oral Talk & Poster
- 74th Int. Society of Electrochemistry (ISE) Meeting Lyon, France (2023) Oral Talk & Poster
- International Flow Battery Forum (IFBF) Prague, Czech Republic (2023) Poster & Conference Paper
- SONAR Workshop Sankt Augustin, Germany (Sep 2023) Poster Presentation