

R. PRAKASH

Scientist F & Head, Centre for Automotive Energy Materials (CAEM)
International Advanced Research Centre for Powder Metallurgy & New Materials (ARCI)
IITM Research Park, 7th Floor, 6-Kanagam Road, Taramani, Chennai-600113. India
Phone: +914466632810; Fax: +91 4466632802
E-Mail: rprakash@arci.res.in

EDUCATION

Ph.D. Chemistry (Apr 1995–May 1999)

Central Salt & Marine Chemicals Research Institute, Bhavnagar University, Bhavnagar, India
Thesis title: Activation of N–N bonds by coordinately unsaturated transition metal complexes and catalytic reduction of nitrogenous compounds in aqueous solution

M.Phil. Chemistry (Jan 1993–Dec 1994)

Department of Chemistry, Bharathiar University, Coimbatore, India
Thesis title: Studies on alpha- and beta-alanine complexes of metal with hydrazine

M.Sc. Chemistry (May 1990–Dec 1992)

Sri Ramakrishna Mission Vidyalaya Arts and Science College, Bharathiar University, Coimbatore, India
Thesis title: A study of jigger dyeing on cotton fabrics and beam dyeing of polyester fabrics

B.Sc. Chemistry (May 1987–Apr 1990)

Sri Ramakrishna Mission Vidyalaya Arts and Science College, Bharathiar University, Coimbatore, India

PROFESSIONAL EXPERIENCE

Scientist F (Oct 2019-Present), **Scientist E** (Jun 2014-Sep 2019) & **Senior Scientist** (Jan 2012-Jun 2014)
Centre for Automotive Energy Materials (CAEM), ARCI Chennai, India

Scientist (Dec 2007-Dec 2011)

Karlsruhe Institute of Technology (KIT), Institute of Nanotechnology (INT), Karlsruhe, Germany

Research Scientist (Jul 2004–Nov 2007)

Institute of Organic Chemistry, University of Erlangen-Nuernberg, Erlangen, Germany

Postdoctoral Research Fellow (Oct 1999–Jun 2004)

Institute of Inorganic Chemistry, University of Erlangen-Nuernberg, Erlangen, Germany

Provisional Research Associate (Apr 1999–Sep 1999)

Central Salt & Marine Chemicals Research Institute, Bhavnagar, India

Junior/ Senior Research Fellow (Apr 1995–Mar 1999)

Central Salt & Marine Chemicals Research Institute, Bhavnagar, India

PROJECT HANDLED/HANDLING

ARCI, Chennai (2012-present)

- Fabrication of in-house sodium-ion batteries for energy storage application (5.4 Lakhs, Industry collaboration, Indi-Energy, Roorkee, as PI, initiated)
- Technical know-how support for the establishment of LIB pilot plant facility and manpower training (4.5 Crores; Industrial project, NSURE Bengaluru, as PI; ongoing)
- Technical support for setting up of demonstration LFP/graphite lithium-ion cell production facility (1.0 Crore; Industrial project, Leep e-drive Hosur, as PI; ongoing)
- Development of Carbon coated Nickel Manganese Cobalt Oxide (C-NMC 532) electrode materials (2.3 lakhs, CRADA MOU, Lithium power technology, Mumbai, as member; ongoing).
- Technical Research Centre for Alternative Energy Materials and System (95 Crores as PI for the sub project A1: Lithium ion batteries and BMS for electric vehicles; Phase 1 completed and 25 Crores, Phase 2 ongoing)

- Development of Li-ion batteries for electric vehicle application (20 Crores; SERB project, as Co-PI; completed)
- High voltage carbon encapsulated $\text{LiMn}_2\text{O}_4:\text{LiNi}_{1-x-y}\text{Co}_x\text{Al}_y\text{O}_2$ cathodes for researchable Li-ion pouch cells (64,5 Lakhs, MES Project as Co-PI; completed)
- Development of low-cost sodium ion batteries for grid and off-grid storage applications (64,5 Lakhs, MES Project as Co-PI; completed)

Karlsruhe Institute of Technology, Germany (2007-2011)

- Development of high-energy density conversion electrode materials for lithium-ion batteries for electric vehicles and energy storage applications

University of Erlangen-Nurnberg, Germany (1999-2006)

- Synthesis of novel metal-centered mixed-valent heterometallic wheels for Single Molecule Magnets applications
- Investigation of sulfur-rich ruthenium nitrosyl complexes as nitric oxide drug delivery agents
- Sulfur-rich Ni/Fe complexes: A structural and functional mimic of [NiFe] hydrogenases
- Studies of sulfur-rich Fe/Ru/Os complexes in relevant to nitrogenases function

ACCOMPLISHMENT HIGHLIGHTS

ARCI, Chennai (2012-present)

- Established the pilot plant facility for Lithium ion cell fabrication; testing facility from cell to pack level including safety and environmental test conditions.
- Developed Lithium ion cell-fabrication technology for $\text{LiFePO}_4/\text{graphite}$ and $\text{LiNMC}/\text{graphite}$ chemistries in various configurations (cylindrical/prismatic/pouch). (TRL>7)
- Developed fast-formation protocol for Lithium-ion cells (Four times faster than standard formation protocol) and confirmed their performance similar to the standard formation cells. It enhances the productivity and reduces the cost.
- The in-house prismatic cells (20 Ah) exhibited excellent performance (>1200 cycles at 1C with >85% capacity retention).
- Implemented novel tab-design in the cell fabrication, which enabled 4C charge/discharge with a low ΔT of 8 °C
- Established Fast charging protocol (100% SoC in 15 min) for Lithium ion cells/packs
- Achieved excellent shelf-life of our cells (>98% capacity retention after 1 year of storage at 100%SoC)
- On road demonstration of indigenous LIB packs for e-scooter (48V, 850 Wh; range 53 km/charge) and e-autorickshaw (60V, 1.5kWh, 45 km/charge), which are on par with commercial packs
- Designed and developed a novel top-lid assembly for cylindrical cells, which enhances the safety of the cell.
- On road city drive protocol has been developed and demonstrated in the pack level.
- Developed business model for manpower training on Lithium ion cell fabrication & testing for industries
- Creating-Industry-Institution model for the establishment of lithium/sodium ion cell manufacturing plant
- Agreement signed on technical support for the establishment of lithium ion cell fabrication & testing and manpower training with NSURE Reliable Power solution. Bangalore
- CRADA signed for upscaling In-situ C-coated Li-NMC for lithium ion batteries
- Indigenously designed and developed a programmable pouch/prismatic stacking machine
- Developed eco-friendly process of making electrodes for lithium ion cells

Karlsruhe Institute of Technology, Germany (2007-2011)

- Developed a novel process for the synthesis of M-LiF-C composite (M = Fe, Co, etc.) conversion cathode materials for lithium-ion batteries EV and ESS applications
- Developed a novel well-constructed $\text{Fe}_3\text{O}_4\text{-C}$ core-shell conversion anode material and this method can be used for the synthesis of all Metal Oxide-C core-shell particles
- Achieved first conversion materials show excellent capacity and extraordinary cyclic stability for the first time.
- Morphology- mechanism-stability co-relation for the conversion material was revealed.

- Produced a new CoFx-type high voltage conversion cathode materials for high power lithium ion batteries.

University of Erlangen-Nurnberg, Germany (1999-2006)

- A novel heterometallic polyhedron-type redox-active complex of octanuclear-iron was achieved for single molecule magnets domain
- Successfully developed a new process for the synthesis of heterometallic wheels with predetermined metal ratios for single molecule magnets application.
- Developed nickel-sulfur complexes which mimic the structural and functional features of hydrogenases enzyme.
- Demonstrated for the first time the release of NO from ruthenium sulfur compounds under visible light for purpose of NO delivering agent to biological targets.
- Synthesized Ni-Fe-Sulfur compounds that exhibited the structural and functional mimic of [Ni-Fe] hydrogenases
- Achieved heterolytic cleavage of molecular hydrogen by thiolate-bridged ruthenium sulfur rich complex for the first time.
- Synthesized various ruthenium-based nitrogenases model compounds and demonstrated the N-N bond activation and catalytic conversion to ammonia

HONOR / AWARD / FELLOWSHIP / MEMBERSHIP

May 2023	Life member in Electrochemical Society of India
Mar 2023	Life Member in Powder Metallurgy Association of India
Apr 2022	Best Poster award at National Conference on Energy Technology, INAE Chennai Chapter, Chennai
Aug 2021	National Project Excellence Award 2021 for LIB project, Project Management Associates, New Delhi
Jan 2020	International Distinguished Scientist in Lithium ion Battery Award, RULA Awards by World Research Council and United Medical Council, Hotel Breeze Residency, Trichy.
Dec 2019	Best Poster Award at NCSSI-13 Conference, IIT-Roorkee, Roorkee.
Nov 2017	Expert Member of BIS Technical Committee TED 27
July 2016	Best Poster Award at FCST Conference, NIT-Warangal, Warangal.
Jun 2014	Member of The Electrochemical Society, American Chemical Society
Sep 2012	Bibliography inclusion of Marquis Who's Who (28th Edition) in the World-2012
Jan 2012	Reviewer for Wiley, ACS, RSC and Elsevier energy materials-based journals
Jun 2011	TOP 100 Scientists ranking in 2011, International Biographical Centre, Cambridge, England
Mar 2011	KIT press release and German TV channel -SWR televised my LIB work on conversion materials
July 2010	Special Poster Award (Nanomaterials in Energy Applications) at ENMAT-2010 conference, Germany
July 2009	LIB Research activities telecasted in TV channels (Bayerischen Rundfunks-Alpha & Deutsche Welle (DW))
Mar 2006	Highlighted Paper in Chemistry A European Journal
Jan 2004	Very Important Paper (VIP) in Angewandte Chemie International Edition
Oct 1999	Postdoctoral Research Fellowship, Deutsche Forschungsgemeinschaft, Institut für Anorganische Chemie, Erlangen, Germany
Apr 1999	Provisional Research Associate, Council of Scientific & Industrial Research, New Delhi
Apr 1997	Senior Research Fellowship, Council of Scientific & Industrial Research, New Delhi
Apr 1995	Junior Research Fellow, Central Salt & Marine Chemicals Research Institute, Bhavnagar
Dec 1994	Distinction status for M.Phil. Thesis, Bharathiar University, Coimbatore
Apr 1991	Academic Proficiency Award in M.Sc., SRKMV Arts College, Bharathiar University, Coimbatore
Apr 1990	Academic Proficiency Award in B.Sc., SRKMV Arts College, Bharathiar University, Coimbatore

INVITED TALK/LECTURE /ORGANIZING/CHARING SESSION IN CONFERENCES

1. Temperature derived Fe dissolution of a LiFePO₄/graphite cell under fast charging condition, Global Energy Meet (GEM 2024), Los Angeles, USA, March 4-8, 2024, (online).
2. Energy Storage: Lithium-ion batteries ecosystem @ ARCI, Sustainable Bharat-2024, Sustainability & Energy Practitioners Association (SEPA), Andhra Chamber of Commerce, Chennai, March 1, 2024.

3. Indigenous battery technology development for Atma Nirbhar Bharat initiative, KPIT Sodium-ion technology Launch Program, Pune, December 12, **2023**.
4. Effect of temperature on cyclic stability of lithium iron phosphate cathodes derived by eco-friendly process for lithium-ion batteries, International Meeting on Energy Storage Devices (IMESD-2023) & Defence-Industry-Academia Conclave, IIT Roorkee, December 7-10, **2023**.
5. Lithium ion battery ecosystem at ARCI-System to Device to Materials, National Workshop on Coating Technologies for Industrial Application, Sathyabama Institute of Science and Technology, Chennai, September 26-27, **2023**.
6. Stakeholder Consultation on Battery Energy System solution (Indo-UK Experts), NITI Aayog, New Delhi, June 6, **2023**
7. Advantages of centralized cell fabrication and testing facilities on consortium mode, EV Consortium Conclave on LTO Batteries and its BMS, Kerala Development and Innovation Strategic Council (K-Disc), Thiruvananthapuram, on April 5, **2023**.
8. Moderated the Session on Propects of LTO Batteries: Challenges in manufacturing, packaging, protection, safety and marketing, EV Consortium Conclave on LTO Batteries and its BMS, Kerala Development and Innovation Strategic Council (K-Disc), Thiruvananthapuram, on April 5, **2023**.
9. Panelist in the Session on Requirement of Energy Storage System (ESS) manufacturing - State and Central aiding Policies/Schemes/Systems, EV Consortium Conclave on LTO Batteries and its BMS, Kerala Development and Innovation Strategic Council (K-Disc) EV Consortium Conclave Series, Thiruvananthapuram, April 5, **2023**.
10. Round table discussion on the Roadmap for an Aatmanirbhar Battery Ecosystem, WRI India, New Delhi, March 22, **2023**.
11. Discussion on Strengthening Sub-National Action for E-mobility, NITI Aayog, India Habitat Centre, New Delhi, March 22, **2023**.
12. Eco-friendly method of fabrication of lithium iron phosphate as stable cathode for lithium-ion batteries, International Conference on Powder Metallurgy & 48 ATM of PMAI, Mumbai, 13-15 March, **2023**.
13. Enhanced cycle LiFePO₄/graphite based lithium-ion cells by controlled fast charging protocol, and Chaired the session on Battery 4, Asian Conference on Electrochemical Power Source 11 (ACEPS 11), National University of Singapore, Singapore, December 11-14, **2022**
14. Organized the sessions on Materials for Advanced Batteries and Chaired a session on Materials for Advanced Batteries II (B1-14) at the Annual Technical Meeting of Indian Institute of Metals (ATM-IIM), Ramoji Film City, Hyderabad, November 13-16, **2022**.
15. Development of lithium-ion batteries ecosystem for electric mobility and energy storage applications, The international conference on beyond fossil fuels: The future of alternative energy technologies (B:FAT2020), IIT BHU, Varanasi, July 22-25, **2022**
16. Lithium-Ion Batteries for emerging demands: progress and challenges, National conference on energy technology, IIT Madras/ARCI, Chennai, April 29-30, **2022**
17. Integrated approach in science and technology for a sustainable future, National Science Day Celebration-2022, Aarupadai Veedu Institute of Technology (AVIT), Kanchipuram, February 28, **2022**.
18. Perspective of lithium ion batteries in electric mobility, 1st world rechargeable cell technology conference, C-MET Pune, July 1-3, **2021**
19. Graphitization of TAMIN carbon for lithium ion battery application, TN-Govt.-TAMIN-ARCI Meeting, Chennai, February 25, **2021**.
20. An overview of lithium-ion battery technology and materials development at ARCI, Golden Jubilee Conference, DST, New Delhi, January 22, **2021**.
21. Lithium-ion cell technology and materials development at ARCI, Indo-African Bilateral Workshop, December 16, **2020** (online).
22. Energy materials for e-mobility applications, International Conference on Automotive Materials and Manufacturing, ARAI Pune, December 3-4, **2020**, (online).
23. Tailoring the structure of materials and electrode fabrication process for high power lithium ion batteries, International workshop on Materials for Energy Conversion and storage, IIT Tirupati, December 24-25, **2019**.

24. Development of lithium-ion battery for the integration of e-mobility and renewable energy, *Industry-Academia Conclave for the integration of e-mobility and renewable energy*, VIT Vellore, December 13, **2019**.
25. Li-ion battery program at ARCI for electric mobility application, *Meeting on establishment of Center of Excellence in Energy Storage Technologies for EV and portable mobile device applications*, IIT Bhilai, Bhilai, April 30, **2019**.
26. Li-ion batteries for Electric Vehicles, *Workshop for ETWDC*, Kongu College of Engineering, Erode on March 15, **2019**.
27. Li-ion batteries for green energy applications, *National symposium on green energy and its green chemistry for sustainable future*, Menakshi college for Women, Chennai, February 22, **2019**.
28. Li-ion batteries and beyond, *Batteries, innovation and safety, going beyond lithium Workshop*, New Delhi, February 25-27, **2019**.
29. Development of Materials and components for clean energy applications, *National conference on renewable energy and its applications in mitigation of climate changes*, PSGR Krishnammal College of Women, Coimbatore, January 21-22, **2019**.
30. Li-ion battery development at ARCI for electric mobility, *Second IESA ICAT EV Conclave*, IMT Manesar, Gurgaon, May 17-18, **2018**.
31. Development of electrode for fabrication lithium ion batteries for electric vehicle application, *Conclave on Materials & Technologist in Energy Conversion & Storage (MTECS 2018)*, IIITDM, Kanchipuram, December 28 - 29, **2018**.
32. Development and upscaling of electrode materials and fabrication of lithium-ion cell/battery for electric vehicle application, *International Meeting on Energy Storage Devices (IMESD) –2018*, IITR, Roorkee, December 10 –12, **2018**.
33. Lithium-ion battery on electric mobility, *Electric vehicles initiatives and technology (eVIT) conclave*, Vellore Institute of Technology (VIT), Chennai, March 10, **2018**.
34. Green technology development at ARCI, National conference on global warming, green energy and environmental pollution- Go Green 2018, Velammal Institute of Technology, Chennai, March 9, **2018**.
35. Lithium ion battery for electric vehicles-A collective effort for a first GWh manufacturing facility in India, The First LIB group meeting for NMEM Scheme, ARCI Chennai, July 2, **2016**
36. Lithium ion battery development program at ARCI for Electric Vehicle Application, *Indo-US Science and Technology Forum workshop on Recent Advances in Multiscale, Multiphysics Analysis of Energy conversion in Li-ion Batteries*, IIT Bombay, Mumbai, June 17-19, **2016**.
37. Lithium ion Battery Technology for Electric Vehicle Application, PoSDAC Workshop, RCI, Hyderabad on April 28, **2015**.
38. Development of large lithium-ion batteries for electrical vehicle applications, *Indo-UK joint seminar on functional energy materials, manufacturing and structures (FAEMMA-2013)*, University of Hyderabad, Hyderabad, Mar 26, **2013**.
39. Metallocene based [M/LiF/C] nanocomposite as stable electrode in lithium ion batteries, *Advanced Research Center International (ARCI) for Powder Metallurgy & New Materials (ARCI)*, Hyderabad, India, Feb 18, **2011**.
40. Ferrocene based carbon-Iron/lithium fluoride nanocomposite as stable electrode material in lithium batteries, *Materials Challenges in Alternative & renewable Energy 2010*, Cocoa Beach, Florida, USA, Feb 21-25, **2010**.
41. Synthesis and reactivity studies of sulfur- and oxygen-rich transition metal compounds, *Institute of Nanotechnology, Forschungszentrum Karlsruhe*, Karlsruhe, Germany, Sep 23, **2007**.
42. High Performance Liquid Chromatography, *School of Biomedical and Natural Sciences, Nottingham Trent University*, Nottingham, UK, May 25, **2007**.
43. Radioactivity– A Context Based Learning, *Centre of Effective Learning in Science (CELS)*, Nottingham Trent University, Nottingham, UK, Mar 15, **2007**.
44. Chemistry of Group 14 elements, Department of Chemistry, *National University of Ireland, Galway, Ireland* Oct 23, **2006**.
45. Synthetic model compounds to nitrogenase and hydrogenase enzymes, *Central Salt and Marine Chemicals Research Institute, Bhavnagar*, India, Jan 16, **2002**.

PUBLICATION

Patent

1. A top-lid assembly for a battery cell and a method for producing the top lid assembly, L. Babu, V.V.N. Phan Kumar, K. Shanmugam, A. Sivaraj, R. Gopalan, T.N. Rao, **R. Prakash**, (filed) **2024, Indian Patent App.No. 202441016527**.
2. System and method for fast charging of lithium ion batteries, V. R. Rikka, S. Mohanasundaram, D. Vigneswaran, T. Mohan, R. Gopalan, G. Sundararajan, **R. Prakash**, (filed), **2022, Indian Patent App. No. 202241044449**.
3. Process for the fast formation of solid electrolyte interphase layer on the anode surface in lithium-ion battery, V. R. Rikka, S. R. Sahu, **R. Prakash**, R. Gopalan, G. Sundararajan, (202011052906), **Indian Patent No.452811, 2023**.
4. Cathode material for fluoride-based conversion electrodes, method for the production thereof and use thereof. M. Fichtner, H. Hahn, **R. Prakash**, **US Patent, 2013, US8568618-B2**.
5. Carbon encapsulated transition metal oxide nanocomposite, a method for its preparation and its use in Li-ion batteries, M. Fichtner, H. Hahn, **R. Prakash**, **Eur. Patent, 2013, EP 2578539 A1-20130410**.
6. Carbon encapsulated transition metal oxide nanocomposite, a method for its preparation and its use in Li-ion batteries, M. Fichtner, H. Hahn, **R. Prakash**, **PCT Intenational, 2013, WO 2013050115, A1-20130411**.
7. Cathode material for fluoride-based conversion electrodes, method for the production thereof and use thereof. M. Fichtner, H. Hahn, **R. Prakash**, **PCT International. 2010, WO 2010115601 A1-20101014**.
8. Kathodenmaterial für fluorid basierte Konversionselektroden, Verfahren zu seiner Herstellung und seine Verwendung M. Fichtner, **R. Prakash**, H. Hahn, **Ger. Offen. 2010, DE 102009017262, A1-20101014**.
9. An improved process for the preparation of ammonia. **R. Prakash**, V. K. Shahi, P. Ray, G. Ramachandraiah, R. Rangarajan, **Indian Pat. Appl. 2008, IN 2001DE00042, A- 20080801**.

Book Chapter

1. Carbon encapsulated-iron lithium fluoride nanocomposite as high cyclic stability cathode material in lithium batteries. **R. Prakash**, C. Kuebel, M. Fichtner, In *Materials Challenges in Alternative & Renewable Energy*; G. Wicks et al. Eds.: *J. American Ceramic Society Transaction volume 224*, John Wiley & Sons Inc., New Jersey, **2011**, pp. 173–181.
2. Electrocatalytic activation and reduction of nitrogen-nitrogen bonds in aqueous solution. **R. Prakash**, G. Ramachandraiah, In *Recent Advances in Basic and Applied Aspects of Industrial Catalysis*; T. S. R. Rao, M. G. Dhar. Eds.; *Studies Surface Science and Catalysis volume 113*, Elsevier, Amsterdam, **1998**, pp. 519–527.

Journal Paper

1. Open-pore type micron-sized lithium iron phosphate cathode using environmental binders for lithium-ion batteries, V.V.N. Phani Kumar, K. Shanmugam, A. Sivaraj, T.P. Sarangan, T. Mohan, R. Prakash, *ACS Energy Fuel*, Submitted.
2. Temperature derived Fe dissolution of a LiFePO₄/graphite cell at fast charging and high state-of-charge condition, VR Rikka, SR Sahu, A Chatterjee, C. Sudakar, G Sundararajan, R. Gopalan, **R Prakash**, *Energy Technol.* **2023**, 2201388
3. Enhancing cycle life and usable energy density of fast charging LiFePO₄-graphite cell by regulating electrodes' lithium level, VR Rikka, SR Sahu, A Chatterjee, **R Prakash**, G Sundararajan, R. Gopalan, *iScience*, **2022**, 104831
4. A facile synthesis of raspberry-shaped Fe₃O₄ nanoaggregate and its magnetic and lithium-ion storage properties S.R. Sahu, M. Jagannatham, Ravi Gautam, V. R. Rikka, **R. Prakash**, K.J. Mallikarjunaiah, G. S. Reddy, *Mater. Sci. Eng. B*, **2022**, 282, 115771.
5. Synergistic-effect of high Ni content and Na dopant towards developing a highly stable Li-Rich cathode in Li-ion batteries, M Vivekanantha, RSA Saravanan, PK Nayak, **R Prakash**, KK Bharathi, *Chem. Eng. J.* **2022**, 444, 136503.
6. Composition-Dependent Long-Term Stability of Mosaic Solid-Electrolyte Interface for Long-Life Lithium-Ion Battery, V. R. Rikka, S R. Sahu, A. Chatterjee, R. Gopalan, G. Sundararajan, **R Prakash**, *Batter. Supercaps*, **2021**,4, 1720-1730.

7. A novel α -MoO₃/single-walled carbon nanohorns composite as high-performance anode material for fast-charging lithium-ion battery, S R. Sahu, V. R. Rikka, P. Haridoss, A. Chatterjee, R. Gopalan, **R. Prakash**, *Adv. Energ. Mat.*, **2020**, 10, 2001627.
8. A sustainable tamarind kernel powder based aqueous binder for graphite anode in lithium-ion batteries, V.V. N. Phanikumar, B.V. Appa Rao, K.V. Gobi, R. Gopalan, **R. Prakash**, *ChemistrySelect*, **2020**, 5, 1199-1208.
9. Tailoring micro resistance spot welding parameters for joining nickel tab to inner aluminium casing in a cylindrical lithium ion cell and its influence on the electrochemical performance, V. R. Rikka, S. R. Sahu, A. Roy, S. N. Jana, D. Sivaprahasam, **R. Prakash**, R. Gopalan, G. Sundararajan, *J. Manuf. Process.*, **2020**, 49, 463-471.
10. Superior cycling and rate performance of micron-sized Tin using aqueous-based binder as a sustainable anode for lithium-ion batteries, S. R. Sahu, V. R. Rikka, P. Haridoss, R. Gopalan, **R. Prakash**, *Energy Technol.*, **2020** 7, 1900849
11. Sc-doping induced cation-disorder in LiNi_{0.5}Mn_{1.5}O₄ spinel leading to improved electrochemical performance as cathode in lithium ion batteries, S. Bhuvanewari, U.V. Varadaraju, R Gopalan, **R. Prakash**, *Electrochim. Acta*, **2019**, 327, 135008.
12. Synthesis of cobalt-rich alloys with high saturation magnetization: A novel synthetic approach by hydrazine reduction method. G S Reddy, S.R. Sahu, **R. Prakash**, M. Jagannatham, *Results Phys.*, 12, **2019**, 652–661
13. Effect of carbon nanohorns on the electrochemical performance of orthorhombic, hexagonal and monoclinic tungsten trioxide nanoplatelets as high-energy anode material for lithium ion batteries S.R. Sahu, V. R. Rikka, P. Haridoss, R. Gopalan, **R. Prakash**, *ECS Meeting (235)*, **2019**, 01, A04.
14. Structural stability and superior electrochemical performance of Sc-doped LiMn₂O₄ spinel as cathode for lithium ion batteries, S. Bhuvanewari, U.V. Varadaraju, R. Gopalan, **R. Prakash**, *Electrochimica Acta*, **2019**, 342-351.
15. Investigation on polyvinyl alcohol and sodium alginate as aqueous binders for lithium-titanium oxide anode in lithium-ion batteries, V.V.N. Phanikumar, V.R. Rikka, B. Das, R. Gopalan, B.V.A. Rao, **R. Prakash**, *Ionics*, **2018**, 1-13.
16. N-Doped graphene with anchored ZnFe₂O₄ nanostructures as an anode for lithium ion batteries with enhanced reversible capacity and cyclic performance, D. Navadeepthy, S. Bhuvanewari, **R. Prakash**, C. Viswanathanan and N. Ponpandian, *New J. Chem.*, **2018**,42, 16564-16570.
17. In Situ/ex Situ Investigations on the Formation of the Mosaic Solid Electrolyte Interface Layer on Graphite Anode for Lithium-Ion Batteries, V.R. Rikka, S.R. Sahu, A Chatterjee, P. V. Satyam, **R. Prakash**, M. S. R. Rao, R Gopalan, G Sundararajan, *J. Phys. Chem. C*, **2018**, 122 (50), 28717–28726.
18. Tungsten trioxide nanoparticles-carbon nanohorns composite as anode material for lithium-ion batteries, S.R. Sahu, V.R. Rikka, H. Prathap, R. Gopalan, **R. Prakash**, *ECS Meeting (233)*, **2018**, 1, A01.
19. Tamarind seed skin derived fibre-like carbon nanostructures as novel anode material for lithium-ion battery, Sumit Ranjan Sahu, D. Parimala Devi, V. V. N. Phanikumar, T. Ramesh, N. Rajalakshmi, G. Praveena, **R. Prakash**, B. Das, R. Gopalan, *Ionics*, **2018**, 1-9.
20. Microstructure and Mechanical Properties of Pulse Laser Welded Stainless Steel and Aluminum Alloys for Lithium-Ion Cell Casings, V.R. Rikka, S.R. Sahu, R. Tadepalli, R. Bathe, T. Mohan, **R. Prakash**, G. Padmanabham, R. Gopalan, *Mat. Sci. Eng. B-Adv.*, **2016**, 6, 218-225.
21. Synthesis of graphene sheets from single walled carbon nanohorns: Novel conversion from cone to sheet morphology, SR Sahu, Vallabha Rao Rikka, M. Jagannatham, Prathap Haridoss, Abhijit Chatterjee, Raghavan Gopalan, Raju Prakash, *Materials Res. Exp.*, **2017**, 4, 035008.
22. Facile synthesis of carbon encapsulated Fe₃O₄ nanocomposite and its performance as anode material in lithium-ion batteries. **R. Prakash**, K. Fanselau, S. Ren, T. K. Mandal, K. Kuebel, H. Hahn, M. Fichtner, Beilstein *J. Nanotechnol.*, **2013**, 4, 699.
23. Nano batteries: Future of automotive transportation. T. N. Rao, **R. Prakash**, *Nano Digest*, **2013**, 4, issue 8, 28-31.
24. Fe₃O₄ anchored onto helical carbon nanofibers as high-performance anode in lithium-ion batteries, S. Ren, **R. Prakash**, D. Wang, V. S. K. Chakravadhanula, M. Fichtner, *ChemSusChem*, **2012**, 5, 1394-1400.
25. Synthesis of [Co/LiF/C] nanocomposite and its application as cathode in lithium-ion batteries, C. Wall, **R. Prakash**, K. Kuebel, H. Hahn, M. Fichtner, *J. Alloys Comp.*, **2012**, 530, 121-126.

26. New battery material for electric vehicles, **R. Prakash**, M. Fichtner, *KIT News Lett.* **2011**, *42*, 1-2.
27. Modified synthesis of [Fe/LiF/C] nanocomposite and its application as cathode material in lithium batteries, **R. Prakash**, A. K. Mishra, C. Wall, C. Kuebel, H. Hahn, M. Fichtner, *J. Power Sources*, **2011**, *196*, 5936–5944.
28. C-encapsulated-Fe/LiF nanocomposite as high stability cathode material in Li batteries. **R. Prakash**, C. Kuebel, M. Fichtner, In *Materials Challenges in Alternative & Renewable Energy*; G. Wicks et al. Eds.: *J. Am. Ceram. Soc. Trans.* **2011**, *224*, John Wiley & Sons Inc., New Jersey, **2011**, 173–181.
29. Ferrocene based carbon-iron lithium fluoride nanocomposite as stable electrode material in lithium batteries, **R. Prakash**, A. K. Mishra, A. Roth, C. Kuebel, T. Scherer, M. Gafari, H. Hahn, M. Fichtner, *J. Mater. Chem.* **2010**, *20*, 1871–1876 (status: **Back Cover Article**).
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Conference / Seminar

1. Micron-sized lithium iron phosphate as cathode using eco-friendly binders for lithium-ion batteries, V.V.N. Phani Kumar, K. Shanmugam, T.P. Sarangan, A. Sivaraj, T. Mohan, **R. Prakash**, International Meeting on Energy Storage Devices (IMESD-2023) & Defence-Industry-Academia Conclave, IIT Roorkee, December 7-10, **2023** (T).
2. Lithium ion battery eco-system for electric vehicle and energy storage application, L. Babu, V. V. N. Phani Kumar, M. Venkatesh, T. Mohan, **R. Prakash**, Amalgam 2023, IITM Chennai, April 21-23, **2023** (P)
3. Indigenous fabrication of Lithium ion cells with LFP/graphite and NMC/graphite cells, L. Babu, V. V. N. Phani kumar, T. Mohan, **R. Prakash**, International Engineering Sourcin Show, Chennai, March 16-18, **2023** (P)
4. Robust Microstructure of Sodium Vanadium Phosphate for Reversible Insertion/ extraction of >2 Moles of Sodium-ions, P. Laxman Mani Kanta, N. Lakshmi Priya, Prajeet Oza, M. Venkatesh, Satyesh Kumar Yadav, Bijoy Das, G. Sundararajan **R. Prakash** and R. Gopalan, 7th International Conference on Sodium-ion batteries, Ulm Germany, December 5-8, **2022** (T).
5. Synthesis of in-situ carbon coated lithium iron phosphate using low-cost iron precursors for lithium ion batteries, V.V.N.Phanikumar, P. Ganeshan, R.Gopalan, **R. Prakash**, U. V. Varadaraju, Indo-French laboratory of solid state chemistry workshop 2022, IISc Bangalore, Bengaluru, October 3-4, 2022 (T)
6. A study of micron-sized lithium iron phosphate as cathode using sustainable binder for lithium ion batteries, V.V.N.Phanikumar, K. Shanmugam, T. P. Sarangan, A. Sivaraj, T. Mohan, R.Gopalan and **R. Prakash**, *International conference on battery science and technology 2022*, ISER Pune, June 2-4, **2022** (T).
7. Investigation of micron-sized lithium iron phosphate as cathode using aqueous binder for lithium ion batteries, V.V.N.Phanikumar, K. Shanmugam, T. P. Sarangan, A. Sivaraj, L. Babu, T. Mohan, R.Gopalan and **R. Prakash**, *National conference on energy technologies*, IITM Chennai, April 29-30, **2022** (T).
8. Tamarind kernel powder as a novel aqueous binder for graphite anode in lithium-ion batteries, V. V. N. Phanikumar, B. V. Appa Rao, K. V. Gobi, R. Gopalan and **R. Prakash**, *13th National Conference on Solid State Ionics (NCSSI-13)*, IITR, Roorkee, December 16 –18, **2019** (P).
9. Development of indigenous lithium-ion battery for electric mobility, S. R. Sahu, V. R. Rikka, R. Gopalan and **R. Prakash**, *IISF 2019*, Kolkata, November 5–8, **2019** (T).
10. $LiSc_0.06Mn_{1.94}O_4$ as prospective cathode for lithium ion batteries for mobility application, S. Bhuvanewari, U. V. Varadaraju, R. Gopalan, R. Prakash, *10th International Conference on Materials for Advanced Technologies (ICMAT)*, NTU Singapore, June 23–28, **2019** (P).
11. Scandium-doped $LiMn_2O_4$ spinel as stable cathode for lithium ion batteries, S. Bhuvanewari, U. V. Varadaraju, R. Gopalan, R. Prakash, *International Conference on Advanced Materials (ICAM-2019)*, Jamia Millia Islamia University, New Delhi, March 6-7, 2019 (P).
12. Effect of state of charges and depth of discharge on the cycle life of $LiFePO_4$ / Graphite Cell at fast charging for Electric Vehicle Applications, V. R. Rikka, S. R. Sahu, A. Chatterjee, **R. Prakash**, R. Gopalan, G. Sundararajan, *48th Power Sources Conference*, Denver, USA, June 11-14, **2018** (T).
13. Polyvinyl alcohol and sodium alginate as alternate green binders of lithium titanium oxide anode for lithium ion batteries, V.V.N.Phanikumar, B.V. Appa Rao, R.Gopalan and **R. Prakash**, *Third National conference on materials for energy conversion and storage*, IIT-BHU, Varanasi, October 18-20, **2018** (T).

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15. Superior Electrochemical Performance of Sc-Doped LiNi_{0.5}Mn_{1.5}O₄ Disordered Spinel as Cathode in Lithium Ion Batteries for Electric Vehicle Applications, S. Bhuvanewari, U. V. Varadaraju, R. Gopalan, **R. Prakash**, *Chemistry Symposium*, IITM Chennai, September 28, **2018** (P).
16. V. V. N. Phanikumar, B. V. Appa Rao, R. Gopalan and R. Prakash, "Effect of polyvinyl alcohol and sodium alginate aqueous binders on lithium titanium oxide anode for lithium-ion batteries" at "National conference on frontiers in chemical sciences and technologies (FCST)" at NIT Warangal, on January 29, **2016** (P)
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19. The effect of electrode thickness on charge/discharge hysteresis of lithium-ion cell, K. Kumari, S.R.Sahu, R.Vallabha Rao, S.Bhuvanewari, M.B.Sahana, **R.Prakash**, R.Gopalan, *NMD,ATM-2014*, College of Engineering, Pune, November 12-15, **2014** (P).
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21. National Mission for Electric Mobility: *Brainstorming session on rechargeable energy storage systems for xEVs*, **R. Prakash**, R. Gopalan, CECRI, Karaikudi, August 22-23, **2013** (A).
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23. Status of ARCI on setting-up of large lithium-ion battery plant, **R. Prakash**, Dr. Mohan, R. Gopalan, *Brainstorming meeting on energy storage devices (Batteries)*, Vigyan Bhavan Annexe, New Delhi, April 9, **2013** (T).
24. Development of large lithium-ion batteries for electrical vehicle applications. **R. Prakash**, T. Mohan, M. B. Sahana, R. Gopalan, *Indo-UK joint seminar on functional energy materials, manufacturing and structures (FAEMMA-2013)*, University of Hyderabad, Hyderabad, March 25-26, **2013** (T).
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35. Batteries, Super-capacitors and Fuel Cells: Performance-safety-quality, 11th Ulm Electrochemical Talks, Fuel Cell Education and Training Center Ulm, Ulm, Germany, June 10, **2008** (T).
36. Cathode materials for lithium ion batteries, J. R. Binder, H. Geßwein, **R. Prakash**, M. Fichtner, *Helmholtz- Review Program NANOMICRO: Science, Technology and System*, Institute of Nanotechnology, Forschungszentrum Karlsruhe, Germany, February 3-5, **2008** (T).
37. *Battery development for hybrid vehicles: Needs, Trends and Prospects*, DECHEMA Colloquium, DECHEMA-Haus, Frankfurt, Germany, January 24, **2008** (T).
38. Fluoride based materials in high energy density lithium batteries, R. Prakash, *Industry-Institute partnership for BMBF project Large-Lithium-Ion Battery (LLIB)*, LiTec Battery GmbH, Kamenz, Germany, December 18, **2007** (T).
39. The first heterometallic mixed-valent diethanolamine wheels. **R. Prakash**, H. Maid, F. Hampel, F. W. Heinemann, R. W. Saalfrank, *International conference on Redox Active Metal Centers in Homogenous and Heterogenous Electron Transfer System*, University of Erlangen-Nürnberg, Erlangen, Germany, October 4-7, **2006** (P).
40. Synthesis and redox properties of mixed-valent octanuclear iron defective hexacubanes and a capped nananuclear iron(III) space-centered orthorhombic disphenoid. **R. Prakash**, R. W. Saalfrank, H. Maid, A. Scheurer, F. W. Heinemann, A. X. Trautwein, L. H. Boettger, *First European Chemistry Congress*, Loránd Eötvös University, Budapest, Hungary, August 27-31, **2006** (P).
41. Redox and magnetic properties of di- and triethanolamine-based supramolecular systems. R. W. Saalfrank, A. Scheurer, **R. Prakash**, S. Spanner, T. Nakajima, H. Maid, F. Hampel, F. W. Heinemann, *Rennes-Erlangen Symposium*, Institute of Chemistry, University of Rennes, Rennes, France, June 20-23, **2006** (T).
42. Searching for single molecule magnets. R. W. Saalfrank, **R. Prakash**, A. Scheurer, L. H. Boettger, V. Schünemenn, A. X. Trautwein, *Sixth International Workshop on Mössbauer Spectroscopy*, The Lufthansa Training Center, Seeheim, Germany, June 7-11, **2006** (P).
43. Synthesis and magnetic properties of mixed-valent Mn wheels, R. W. Saalfrank, A. Scheurer, **R. Prakash**, T. Nikimya, F. Hampel, F. W. Heinemann, P. Mueller, *International Minisymposium on Redox Active Metal Centers in Homogenous and Heterogenous Electron Transfer System*, University of Erlangen-Nürnberg, Erlangen, Germany, February 24-26, **2005** (P).
44. Heterolytic H₂ activation at sulfur-rich metal centers: A step closer to the functional mimic of hydrogenases. **R. Prakash**, F. W. Heinemann, D. Sellmann, *Chemistry Symposium Erlangen-Rennes*, University of Erlangen-Nürnberg, Erlangen, Germany, June 15-19, **2004** (P).
45. Heterolytic H₂ activation by [Ni(SiBu)(^{si}S₃)]. D. Sellmann, **R. Prakash**, F. W. Heinemann, *International SFB-Symposium on Redox-Active Metal complexes-Control of reactivity via Molecular Architecture*, University of Erlangen-Nürnberg, Erlangen, Germany, March 26-29, **2003** (T).
46. Sulfur-rich nickel compounds modeling the reactivity of [NiFe] hydrogenase centers. D. Sellmann, **R. Prakash**, F. W. Heinemann, *Chemistry Symposium Rennes-Erlangen 2001*, Institute of Chemistry, University of Rennes, Rennes, France, April 17-20, **2001** (T).
47. Electrochemical reduction of N₂H₄ in aqueous solution using ruthenium catalyst. **R. Prakash**, G. Ramachandraiah, *National Symposium in Catalysis*, Indian Institute of Science, Bangalore, India, January 27-30, **1999** (T).

48. New electron donors for the catalytic reduction of bound hydrazine. **R. Prakash**, G. Ramachandraiah, *14th National Symposium on Catalysis*, Anna University, Chennai, India, December 16-18, **1998** (T).
49. Activation and reduction of N-N bonds by coordinately unsaturated metal complexes. **R. Prakash**, G. Ramachandraiah, *First AGRS Meet*, MS University, Baroda, India, December 6, **1998** (T).
50. First electrochemical evidence for the electron transfer from metal to the NN bonds of bound N₂ under moderate pressure. **R. Prakash**, G. Ramachandraiah, *National Workshop on Catalysis*, Regional Research Laboratory, Thiruvandram, India, December 11-13, **1997** (T).
51. Electrochemical activation and reduction of N-N bonds in aqueous solution. **R. Prakash**, G. Ramachandraiah, *13th National Symposium on Catalysis*, IIP, Dehra Dun, India, April 2-4, **1997** (T).
52. Efficient electrocatalytic reduction of N₂H₃Ph to NH₃ and NH₂Ph in aqueous solution **R. Prakash**, G. Ramachandraiah, *66th National Academy of Sciences India*, Dr BAM University, Aurangabad, India, October 31-November 2, **1996** (T).
53. Monomeric hydrazinium complexes of Ru^{III} PDTA as electrocatalyst for the efficient reduction of hydrazine in aqueous solution. **R. Prakash**, G. Ramachandraiah, *National Workshop on Catalysis*, CSMCRI, Bhavnagar, India, December 20-22, **1995** (T).
54. Electrometric study on the reduction of N-N bond of metal bound hydrazine in aqueous solution. **R. Prakash**, B. Tyagi, R. Rangarajan, G. Ramachandraiah, *55th Annual Session of National Academy of Sciences India*, S. V. University, Tirupati, India, November 3-5, **1995** (T).
55. Studies on α and β -alanine complexes of metal with hydrazine. **R. Prakash**, S. Govindarajan, *National Symposium on Current trends in Coordination Chemistry*, Cochin University, Cochin, India, March 23-25, **1995**(P).

(A: Attended; P: Poster; T: Talk)

PhD Thesis Guided

1. SEI layer and Ageing studies of Lithium ion batteries, Vallabha Rao Rikka, Centre for Automotive Energy Materials, ARCI Chennai (Jan 2014-present; Ext. guide: Prof. Abhijit Chatterjee, IITB, Mumbai).
2. Synthesis, characterization & doping of olivine/ spinel based materials and its effective binding nature for lithium ion batteries, *V. V. N. Phanikumar*, Centre for Automotive Energy Materials, ARCI Chennai (Dec 2013-June 2021; Ext guide: Prof. K. V. Gobi, NIT Warangal).
3. Single walled carbon nanohorns-based and carbon nanohorns-derived graphene-based anode materials for lithium-ion battery applications, *Sumit Ranjan Sahu*, Centre for Automotive Energy Materials, ARCI Chennai (Jul 2014-Sep 2020); Ext. guide: Prof. Prathap Haridoss, IITM Chennai).
4. Structure, morphology and electrochemical performance correlation in metal doped spinel (Li M_x Mn_{2-x} O₄) (M = Transition metals) as Li ion battery cathode materials, *S. Bhuvaneshwari*, Centre for Automotive Energy Materials, ARCI Chennai (Jul 2014-Jun 2020; Ext. guide: Prof. U. V. Varadaraju, IITM Chennai).
5. Investigation of metallocene based materials as conversion cathodes in lithium ion batteries, *Ben Breitung*, Institute of Nanotechnology, Karlsruhe Institute of Technology, Karlsruhe, Germany (Sept 2010- Dec 2011; Group: Dr. M. Fichtner/ Prof. A. Powell).
6. Transition metal fluorides as cathode materials for lithium ion batteries, *Clemens Wall*, Institute of Nanotechnology, Karlsruhe Institute of Technology, Karlsruhe, Germany (Apr 2009- Dec 2011; Group: Dr. M. Fichtner/ Prof. H. Hahn).
7. Synthesis, Structures and Reactivity of Novel Nitrogenase Relevant Transition Metal Complexes with NS₄⁻ and N₃S₃-Donor Atoms *Shaban Y. Shaban*, Institute of Inorganic Chemistry, University of Erlangen-Nuernberg, Germany (Sep 2000–May 2005; Group: Late Prof. D. Sellmann).
8. Structural and Functional Model Compounds for [NiFe] Hydrogenases, *Frank Lauderbach*, Institute of Inorganic Chemistry, University of Erlangen-Nuernberg. Germany (Jan 2002–Dec 2004; Group: Late Prof. D. Sellmann).
9. Synthesis and Reactivity of Ruthenium Complexes with Sulfur Dominated Coordination Spheres *Alexander U. Czaja*, Institute of Inorganic Chemistry, University of Erlangen-Nuernberg. Germany (May 2002–Jul 2005; Group: Late Prof. D. Sellmann).
10. Syntheses, Structures, and Properties of Metal-Organic Networks. *Menase Ayuck Ako*, Institute of Organic Chemistry, University of Erlangen-Nuernberg. Germany (Jul 2004–Dec 2004; Group: Prof. R. W. Saalfrank).