

CURRICULUM VITAE

Personal Information

Dr. Bijoy Kumar Das

Scientist,

International Advanced Research Centre for Powder Metallurgy & New
Materials (ARCI), India

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Educational Background:

2006-2011 Ph.D. in Physics, Department of Physics, **National University of Singapore (NUS), Singapore. CAP: 4.3/5**

Thesis Title: Studies on Metal Oxides and Cobalt Nitride as prospective anode materials for Lithium-ion Batteries.

Thesis Supervisor: Prof. B.V.R. Chowdari

2004- 2006 Master of Technology in Materials Science and Engineering, **Indian Institute of Technology (IIT), Kharagpur, India. CGPA: 8.84/10**

2002- 2004 Master of Science in Physics, **Utkal University, Odisha, India. Percentage: 75.2/100 (First Class)**

1999-2002 Bachelor of Science (Physics Hons'), **Fakir Mohan University, Odisha, India. Percentage: 80.12/100 (in Hons') (First class with Distinction) 68.7/100 (Grand total).**

Research Experience:

- **Jan 2021-** Scientist, International Advanced Research Centre for Powder Metallurgy & New Materials (ARCI), India
- **Nov 2016- Dec 2022** Project Scientist-C, International Advanced Research Centre for Powder Metallurgy & New Materials (ARCI), India
- **Jan 2012- Oct 2016** Scientist, Helmholtz Institute Ulm (HIU), Institute of Nanotechnology (INT), **Karlsruhe Institute of Technology, Germany.**
- **Jan 2011-Dec 2011** Postdoctoral Researcher, **KTH (Royal Institute of Technology), Stockholm, Sweden.**

Completed/Ongoing/submitted Projects:

1. **Project title:** Low-cost sodium ion battery for the grid and off-grid storage applications
Role: Principal Investigator
Amount: 64.54 Lakhs
Duration: 3 years (Completed)
Funding Agency: Department of Science and Technology (DST), India
2. **Project title:** A novel approach toward developing high energy density and low-cost cathode materials fabricating micro-sized all-solid-state sodium-ion batteries
Role: Mentor
Amount: 30 lakhs INR
Duration: 3 years (Approved in August 2022)
Funding Agency: Department of Science and Technology (DST), India

Research Supervision:

1. Dr. Sonia Sharma; **Post-doctorate fellow** from December 2019- November 2021 (Completed)
Research Topic: Development of high-performance electrode materials for sodium-ion battery applications
2. Mr. Puppala Laxman Mani Kanta; **Ph. D. student** (Completed)
Thesis Title: Scalable synthesis of NASICON type Sodium Vanadium Phosphate and its derivative for commercial Sodium-ion batteries
3. Mr. Venkatesh Manchala; **Ph. D. student** (Expected date of Thesis submission: July 2023)
Thesis Title: Development of low-cost and high-specific energy electrode materials for sodium- ion batteries
4. **M. Tech./M. Sc. Thesis guided:** 11 (Completed)
5. **B. Tech. Thesis guided:** 6 (Completed)

Achievements:

- Setting up the new laboratory facilities for the sodium-ion battery R&D activities in ARCI
- Lithium-ion battery technology know-how transfer to the industry being part of the team in ARCI
- Fabrication and demonstration of lithium ion cells (2-2.5 Ah) from indigenously developed electrode materials
- Large scale synthesis of electrode materials for Lithium and sodium-ion batteries

applications

- Received international patent grant on materials development for sodium ion batteries

Honors and Awards:

- Received 2nd Best Poster award in Industry-Academia Conclave on Energy Storage organized by DST, Govt. of India held on 30th November **2019** at MNIT, Jaipur.
- Received Best Poster award in Second International Meeting on Clean Energy Materials Innovation Challenge IC6, Mission Innovation organized by DST, Govt. of India on 21-22nd February **2019** at IIT Delhi.
- Graduate Research Scholarship, National University of Singapore, Singapore, **2006-2010**.
- Postgraduate scholarship, Council for Scientific and Industrial Research (CSIR), Govt. of India, **2005-2006**.
- Postgraduate scholarship, Ministry of Human Resources and Development (MHRD), Govt. of India, **2004-2005**.
- National Scholarship from higher secondary to Master of Science (**1997-2004**), Govt. of India.
- Best graduate award being placed in the first rank in Physics (Hon's), **2002**.
- Qualified for the prestigious Graduate Aptitude Test in Engineering (GATE)-**2004**, with 97 percentiles; All India rank-83.
- Qualified CSIR-UGC NET (JRF) in Physics-**2004**.

Patents granted/ filed:

1. Microwave assisted sol-gel process for preparing in-situ carbon coated electrode materials and the product thereof", **Bijoy Kumar Das**, P. Laxman Manikanta, N. Lakshmipriya, R. Gopalan, G. Sundararajan, **Japanese Patent: 2020-550159 (Granted)**.
2. Microwave assisted sol-gel process for preparing in-situ carbon coated electrode materials and the product thereof", **Bijoy Kumar Das**, P. Laxman Manikanta, N. Lakshmipriya, R. Gopalan, G. Sundararajan, **Korean Patent: 10-2497808. (Granted)**.
3. Microwave assisted sol-gel process for preparing in-situ carbon coated electrode materials and the product thereof", **Bijoy Kumar Das**, P. Laxman Manikanta, N. Lakshmipriya, R. Gopalan, G. Sundararajan, **European Patent: 20763813.1**.
4. "Microwave assisted sol-gel process for preparing in-situ carbon coated electrode

materials and the product there of,” **Bijoy Kumar Das**, P. Laxman Manikanta, N. Lakshmipriya, R. Gopalan, G. Sundararajan, **Indian Patent 201911008004**.

5. Reversible alteration of a magnetic state of a material” **Bijoy Kumar Das**, Subho Dasgupta, Horst Hahn, Robert Kruk, **European Patent 13172431.2**.

Book Chapters:

1. Synthesis and structure of 2-D materials, **Bijoy Kumar Das**, R. Gopalan, Published in **Emerging Two Dimensional Materials and Applications**, CRC Press, Taylor & Francis Group (In Press) (2022).
2. Intercalation-based Layered Materials for Rechargeable Sodium-ion Batteries, **Bijoy Kumar Das**, R. Gopalan, Published in **Layered Materials for Energy Storage and Conversion**, RSC Publisher (2019), <http://dx.doi.org/10.1039/9781788016193>

Publications (H-index-17; i-10 index-20) (Total citations~>1000)

1. “Nickel Sulfide-Nickel Sulfoselenide Nanosheets as a Potential Electrode Material For High Performance Supercapacitor with Extended Shelf Life”, S. Caroline, **Bijoy Das**, S.S. Pramana, S.K. Batabyal, **J. Energy Storage 68 (2023) 107812**.
2. “High Energy-Power Characteristics of Hierarchical Nitrogen-Doped Mesoporous Carbon Decorated Sodium Vanadium Phosphate in Full cell level”, P Laxman Mani Kanta, M Venkatesh, Satyesh Kumar Yadav, **Bijoy Das***, R Gopalan, **Applied Energy 334 (2023)120665**.
3. “Effect of microstructure and dopants on the electrochemical cyclic stability of layered P2-type $\text{Na}_{0.67}\text{MnO}_2$ prepared by different chemical routes: An experimental and theoretical study”, M. Venkatesh, G. Sudha Priyanga, S.Sharma, P. Laxman Mani Kanta, T. Thomas, R. Gopalan and **Bijoy Das***, **Ceramic International 49 (2023) 6654-6665**.
4. “Investigation of magnetocaloric properties and critical behavior in layered type $(\text{Ce}_{0.65}\text{La}_{0.35})\text{Mn}_2\text{Ge}_2$ room temperature ferromagnet”, **Bijoy Das***, M. Siva Kumar, D. N. Kar, M. Palith and R. Gopalan, **IEEE Transaction on Magnetics 58 (2022) 1-7**.
5. “Unusual Case of Higher Cyclic Stability at a Wider Voltage Window in Sodium Vanadium Phosphate” P Laxman Mani Kanta, N Lakshmi Priya, Prajeet Oza, M Venkatesh, Satyesh Kumar Yadav, **Bijoy Das***, G Sundararajan, R Gopalan, **ACS Appl. Energy Mater. 4 (2021) 12581-12592**.
6. “Magnetic and optical properties of green synthesized nickel ferrite nanoparticles and its application into photocatalysis” D. K. Dinkar, **Bijoy Das***, R. Gopalan, B. S. Dehiya, **Nanotechnology 32 (2021) 505725**.

7. "Enhanced enactment of graphene amalgamated sodium cobalt phosphate composite electrode material in sodium-ion battery" Ganesan Savithiri, Venkatachalam Priyanka, Rengapillai Subadevi, **Bijoy Das**, Marimuthu Sivakumar, **J. Taiwan Inst. Chem. Eng. 126 (2021) 197-204.**
8. "Electric-Potential-Induced Complete Control of Magnetization in MnZnSb Metallic Ferromagnets" Martin Møller Greve, **Bijoy Das**, Ibrahim Issac, Ralf Witte, Di Wang, Robert Kruk, Horst Hahn, Subho Dasgupta, **Adv. Electron. Mater. 7 (2021) 2000790.**
9. "Scalable synthesis and kinetic studies of carbon coated sodium titanate: A promising ultra-low intercalation voltage anode for sodium ion battery", P. Laxman Mani Kanta, M. Venkatesh, Satyesh Kumar Yadav, **Bijoy Das***, R. Gopalan, **Trans. Ind. Nation. Acad. Eng. 5 (2020) 475-483.**
10. "Magnetocaloric properties and critical exponents in anti-PbFCl type ZnMnSb room temperature ferromagnet", D.K. Dinkar, M. Palit, R. Gopalan, **Bijoy Das***, **J. Magn. Mater. 489 (2019) 165437.**
11. "Investigation on polyvinyl alcohol and sodium alginate as aqueous binders for lithium titanium oxide anode in lithium ion batteries", V.V.N. Phanikumar, V. Rao Rikka, **Bijoy Das**, R. Gopalan, B.V. A. Rao, R. Prakash. **Ionics 25 (2019) 2549-2561.**
12. "Effects of surfactant on the structural and magnetic properties of hydrothermally synthesized NiFe₂O₄ nanoparticles" D. K. Dinkar, **Bijoy Das***, R. Gopalan, B S. Dehiya, **Materials Chemistry and Physics 218 (2018) 70-76.**
13. "Tamarind seed skin derived fiber like carbon nanostructures as novel anode material for lithium-ion battery" S. R. Sahu, D. Parimala Devi, V. V. N. Phanikumar, T. Ramesh, N. Rajalakshmi, G. Praveena, R. Prakash, **Bijoy Das***, R. Gopalan, **Ionics 24 (2018) 3413-3421.**
14. "Toward on-and-off magnetism: reversible electrochemistry to control magnetic phase transitions in spinel ferrites" Subho Dasgupta, **Bijoy Das**, Qiang Li, Di Wang, Tessa T Baby, Sylvio Indris, Michael Knapp, Helmut Ehrenberg, Karin Fink, Robert Kruk, Horst Hahn, **Adv. Funct. Mater. 26 (2016) 7507-7515.**
15. "Enhancement of electrochemical performance by simultaneous substitution of Ni and Mn with Fe in Ni-Mn spinel cathodes for Li-ion batteries" Nilüfer Kiziltas-Yavuz, Murat Yavuz, Sylvio Indris, Natalia N Bramnik, Michael Knapp, Oleksandr Dolotko, **Bijoy Das**, Helmut Ehrenberg, A. Bhaskar, **J. Power Sources 327 (2016) 507-518.**
16. "Improved Li-storage performance of heat-treated InFeCoO₄ spinel prepared by glycine

- assisted chemical route” **B. Das***, MV Reddy, BVR Chowdari, **Ionics** **22** (2016) **1585-1591**.
17. “SnO and SnO· CoO nanocomposite as high capacity anode materials for lithium-ion batteries” **B. Das***, MV Reddy, BVR Chowdari, **Mater. Res. Bull.** **74** (2016) **291-298**.
 18. Vanadium and Chromium Molecular Cluster Batteries (MCB): Li-Storage in Transition Metal Complexes J Rinck, **B. Das**, M Fichtner, **ECS Meeting Abstracts**, (2016) **246-246**.
 19. High-performance metal nitrides, MN (M = Cr, Co) nanoparticles for non-aqueous hybrid supercapacitors. **B. Das***, M. Behm, G. Lindbergh, M. V. Reddy, B.V.R. Chowdari, *Advanced Powder Technology* **26** (2015) 783.
 20. Intercalation-Driven Reversible Control of Magnetism in Bulk Ferromagnets. S. Dasgupta, **B. Das**, M. Knapp, R.A. Brand, H. Ehrenberg, R. Kruk and H. Hahn, **Adv. Mater.** **26** (2014) 4639-4644. (Cover page).
 21. LiF/Fe/V₂O₅ nanocomposite as high capacity cathode for Lithium-ion batteries, **B. Das***, A.Pohl, VSK Chakravadhanula, C. Kübel, M. Fichtner, **J. Power Sources** **267** (2014) 203-211.
 22. A disc- like Mo- metal cluster compound, Co₂Mo₃O₈ as high capacity anode for Lithium ion batteries, **B. Das***, M. V. Reddy, S. Tripathy, BVR Chowdari, **RSC Advances** **4** (2014) 33883.
 23. Oxidation state and local structure of a high-capacity LiF/Fe(V₂O₅) conversion cathode for Li-ion batteries, A.H. Pohl, A.A. Guda, V.V. Shapovalov, R. Witte, **B. Das**, F. Scheiba, J. Rothe, A.V. Soldatov, M. Fichtner, **Acta Mater.** **68** (2014) 179.
 24. Disc-Like Mo-Metal Cluster Compound, Co₂Mo₃O₈, as a High Capacity Anode for Lithium Ion Batteries. **B. Das**, M. V. Reddy, S. Tripathy, B. V. R. Chowdari, *ChemInform* **49** (2014); DOI: 10.1002/chin.201449010.
 25. Li- storage of Fe₃O₄/C composite prepared by one- step carbothermal reduction method, **B. Das**, M. V. Reddy, B.V.R. Chowdari, **J. Alloys Compd.** **565** (2013) 90.
 26. X-ray absorption spectroscopy and energy storage of Ni- doped Cobalt Nitride; (Ni_{0.33}Co_{0.67}N) prepared by a simple synthesis route, **B. Das**, M. V. Reddy, B.V.R. Chowdari, **Nanoscale**, **5** (2013) 1961.
 27. Synthesis of porous-CoN nanoparticles and their application as a high capacity anode for lithium-ion batteries, B. Das, M. V. Reddy, G.V. Subba Rao, B.V.R. Chowdari, **J. Mater. Chem.**, **22** (2012) 17505.

28. Synthesis and Li-storage behavior of CrN nanoparticles, **B. Das**, M. V. Reddy, G.V. Subba Rao, B.V.R. Chowdari, **RSC Adv.**, 2 (2012) 9022.
29. "Nano- phase tin hollandites, $K_2(M_2Sn_6)O_{16}$ (M = Co, In) as anodes for lithium ion batteries" **B. Das**, M. V. Reddy, G.V. Subba Rao, B.V.R. Chowdari, **J. Mater. Chem.**, 21 (2011) 1171.
30. "Nano- composites, $SnO(VO)_x$ as anodes for lithium ion batteries" **B. Das**, M.V. Reddy, GV Subba Rao, BVR. Chowdari, **J. Solid State Electrochem.** 15 (2011) 259.
31. "Nanoflake CoN as a high -capacity anode for Li- ion batteries" **B. Das**, M. V. Reddy, P. Malar, Osipowicz Thomas, G.V. Subba Rao, B.V.R. Chowdari, **Solid State Ionics**, 180 (2009) 1061.
32. "Carbothermal synthesis, spectral and magnetic characterization and Li- cyclability of the Mo- cluster compounds, $LiYMo_3O_8$ and $Mn_2Mo_3O_8$ " **B. Das**, M.V. Reddy, C. Krishnamoorthy, S. Tripathy, R. Mahendiran, G.V. Subba Rao, B.V. R. Chowdari, **Electrochim. Acta**, 54 (2009) 3360.
33. "Synthesis of Mo- cluster compound, $LiHoMo_3O_8$ by Carbothermal reduction method and it's reactivity towards Li", **B. Das**, M. V. Reddy, G.V. Subba Rao, B.V.R. Chowdari, **J. Solid State Electrochem.**, 12 (2008) 953-959.
34. "Hollandite-type compounds, $K_2(In_2Sn_6)O_{16}$ and $K_2(Co_2Sn_6)O_{16}$ as anodes for lithium batteries" **B. Das**, M. V. Reddy, G.V. Subba Rao, B.V.R. Chowdari. Proceedings of the 11th Asian conference on Solid State Ionics, (2008) 69-77.
35. "Li-cycling behavior of Mo-cluster compounds, $A_2Mo_3O_8$ (A = Zn, Co)" **B. Das**, M. V. Reddy, G. V. Subba Rao, B. V. R. Chowdari, 12th Asian Conference on Solid State Ionics (2010), China.
36. "Excess sodiated sodium vanadium fluorophosphate for high energy sodium ion batteries" P Laxman Mani Kanta, M Venkatesh, S. Nandy, K. H. Chae, Lakshmi Priya N., Satyesh Kumar Yadav, R Gopalan, **Bijoy Das***, *Nanoscale* (2023) (Under Review).

Manuscripts Under Preparation/To be submitted:

37. "Quasi-diffusion controlled high rate sodium-ion storage performance of flame spray pyrolysis derived hard carbon" Sonia Sharma, R. Gopalan, **Bijoy Das***, (To be submitted).
38. "Biomass-derived Hard Carbon as an Anode Material for Sodium-ion Battery Application", M. Venkatesh, P. Laxman Mani Kanta, T. Thomas, R. Gopalan, T.N.

Rao, **Bijoy Das*** (Under preparation).

39. “Intercalation based anode materials for sodium-ion batteries: A comprehensive review, **Bijoy Das***, T. N. Rao, Wires: Energy Environ. (Invited Review) (To be submitted)
40. “Sodium-ion Battery: Materials development and its Applications, **Bijoy Das***, T. N. Rao, Chem Comm. (Invited Review) (Under Preparation)

*refers to the corresponding author

Invited Lectures, Invited/contributed oral presentations in international/national conferences:

1. **Invited lecture on** “Fundamentals of Electrochemistry and its applications to various energy storage systems: In particular to Lithium and sodium ion Batteries”, **Bijoy Kumar Das** at VIT, Chennai on 11-12th April 2023. (Invited)
2. **Invited lecture on**, “Sodium over Lithium: The low-cost alternative to Li-ion batteries for Indian subcontinent” **Bijoy Kumar Das**, Faculty Development program organized by Department of Chemistry, Vasavi College of Engineering (A), Hyderabad on 10th October 2022.
3. **Invited lecture on** “Introduction to Electrochemical Sensors”, **Bijoy Kumar Das** at VIT, Chennai on 25th May 2022. (Invited)
4. **Invited talk on** “Sodium ion Batteries: Towards a sustainable and low cost energy storage technology”, **Bijoy Kumar Das**, National Conference on Energy Technologies (NCET-2022) on 29-30th April 2022 organized by INAE Chennai Chapter along with IIT Madras and ARCI, Chennai.
5. **Invited talk on** “Sodium-ion Batteries: Alternative and Advanced Battery Technology for Electric Vehicles”, **Bijoy Kumar Das**, Training program organized by IESA in coordination with ARAI during 5th-7th October 2021.
6. **Invited lecture on** “Batteries for Electric Vehicles”, **Bijoy Kumar Das**, AICTE sponsored Online Short Term training Programme (STTP) on “Recent Advances on Hybrid and Electric Vehicle Technologies” during 16th -21st of November 2020.
7. **Invited talk on** “Low-cost and high specific energy Li-S batteries: Challenges towards its practical applications” **Bijoy Kumar Das**, Workshop on Advance Battery Technology: Beyond Lithium-ion, ARAI-IESA Jt. online Proficiency Improvement Programme (oPIP), 06th -08th October 2020.

8. “Low-cost sodium ion battery for grid and off-grid applications” P. Laxman Mani Kanta, M. Venkatesh, N. Lakshmi Priya, **Bijoy Kumar Das**, Industry-Academia Conclave on Energy Storage held at MNIT Jaipur on 30th November 2019 organized by DST, Govt. of India (Invited).
9. “Carbon coated sodium titanates as ultra-low voltage anode for sodium-ion battery” **Bijoy Kumar Das**, P. Laxman Manikanta, R. Gopalan, International Conference on Advanced Materials and Processes (ADMAT), Hyderabad, India, 23-25 September 2019.
10. “Towards Rechargeable Sodium-ion Battery- Material’s challenges and Developments of their developments” **Bijoy Kumar Das**, R. Gopalan, 3rd International Conference on Advanced Materials (ICAM), Kottayam, India, 9-11 August 2019 (Invited).
11. Improved Electrochemical Performance of Iron and Cobalt Co-substituted Layered P2- $\text{Na}_{0.67}\text{MnO}_2$ Cathode Material for Sodium-Ion Battery Application, **Bijoy Kumar Das**, Venkatesh Manchala, R. Gopalan, 10th International Conference on Materials for Advanced Technologies (ICMAT), 13-28 June 2019, Singapore.
12. **Invited Lecture on** “Electrochemical Energy Storage Systems- Materials challenges and developments”, **Bijoy Kumar Das**, VIT Vellore, 8th March 2019. (Invited Lecture)
13. “Development of low-cost sodium ion batteries for grid and off-grid storage applications”, **Bijoy Kumar Das**, 2nd International Meeting on Clean Energy Materials Innovation Challenge, 21-22 February 2019 (Invited).
14. “Electrochemical impedance spectroscopy (EIS) analysis for lithium ion battery **Bijoy Kumar Das** *, R. Prakash and R. Gopalan, Indian Analytical Science Congress (IASC) 2018, Kerala Chapter.
15. “ FeF_2 /graphite nanocomposite: Its Li- storage and kinetic studies by electrochemical techniques, **Bijoy Kumar Das**, M. Fichtner, International conference on Energy Science and Technology, Karlsruhe, Germany, 2015.
16. Vanadium and Chromium Molecular Cluster Batteries (MCB): Li- storage and kinetic studies by electrochemical analysis, J. Rinck, **Bijoy Kumar Das**, M. Fichtner, International conference on Energy Science and Technology, Karlsruhe, Germany, 2015.
17. New battery systems based on conversion materials: M. Fichtner, **Bijoy Kumar Das**, M. Helen, A. Pohl, M. Anji Reddy, Zh. Zhao-Karger; Batterieforum Berlin, Germany, 2015.
18. $\text{FeF}_2/\text{Fe}_3\text{O}_4$ core-shell nanocomposite as high capacity cathode for Lithium ion batteries, **Bijoy Kumar Das**, CVS Kiran, M. Fichtner, 14th UECT Ulm Electrochemical Talks, 2014.

19. Oxidation State and Local Structure of a High-Capacity LiF/Fe(V₂O₅) Conversion Cathode for Li-Ion Batteries, A.H. Pohl, A.A. Guda, V.V. Shapovalov, R. Witte, **Bijoy Kumar Das**, F. Scheiba, J. Rothe, A.V. Soldatov, M. Fichtner, ECS meeting abstract:37215 (2014).
20. Oxidation state and local structure of a high-capacity LiF/Fe/V₂O₅ conversion cathode for Li-ion batteries, A. Pohl, Bijoy Kumar Das, CVS Kiran, M. Fichtner, 14th UECT Ulm Electro Chemical Talks, 2014.
21. LiF/Fe/V₂O₅ as high capacity anode for Lithium ion batteries, Bijoy Kumar Das, A. Pohl, M. Fichtner, 2nd International Conference on Materials for Energy Storage, May 12-16 (2013), Karlsruhe, Germany.
22. “Li-cycling behavior of Mo-cluster compounds, A₂Mo₃O₈ (A = Zn, Co)” Bijoy Kumar Das, M. V. Reddy, G. V. Subba Rao, B. V. R. Chowdari, Proceedings of the 12th Asian conference on Solid state Ionics: Fundamental applications and Technological applications; 2-6 May 2010, China. Pages, 820-829.
23. “Studies on CrN nanoparticles as anode material for lithium ion batteries” Bijoy Kumar Das, M. V. Reddy, G. V. Subba Rao, B.V.R. Chowdari. Abstract submitted to the 4th MRS-S Conference on Advanced Materials, 2010 IMRE, Singapore.
24. “Nanocomposites, (SnO._{1/2} VO_x) as anodes for lithium ion batteries” Bijoy Kumar Das, M. V. Reddy, G. V. Subba Rao, B.V.R. Chowdari, presented at International conference on materials for advanced Technologies (ICMAT) -2009 held on 28 June - 3 July, 2009 Suntec city, Singapore.
25. “Hollandite-type compounds, K₂(In₂Sn₆)O₁₆ and K₂(Co₂Sn₆)O₁₆ as anodes for lithium batteries” Bijoy Kumar Das, M. V. Reddy, G.V. Subba Rao, B.V.R. Chowdari. Proceedings of the 11th Asian conference on Solid state Ionics: New materials for pollution free Energy devices; 69-77 (2008), India.
26. “Metal cluster compounds, of LiYMo₃O₈ and Mn₂Mo₃O₈ as anode for lithium ion Batteries” Bijoy Kumar Das, M. V. Reddy, G. V. Subba Rao, B.V.R. Chowdari. Abstract submitted to the 3rd MRS-S conference on Advanced Materials, 2008 IMRE, Singapore.
27. “Synthesis of Mo- Cluster compound, LiHoMo₃O₈ by carbothermal reduction method and it’s reactivity towards Li” Bijoy Kumar Das, M. V. Reddy G. V. Subba Rao, B.V.R. Chowdari, presented at International conference on materials for advanced Technologies (ICMAT) -2007 held on 1-5 July, 2007 Suntec city, Singapore.

Reviewer of Journals:

- 1) ACS Omega
- 2) Journal of Magnetism and Magnetic Materials
- 3) Chemical Communication
- 4) Materials Chemistry and Physics
- 5) Powder Technology
- 6) Nano-Micro Letters
- 7) New Journal of Chemistry
- 8) RSC Advances
- 9) ACS Sustainable Chemistry & Engineering
- 10) Journal of Alloys and Compounds
- 11) Electrochimica Acta
- 12) Materials Research Bulletin

Teaching experience:

Laboratory Assistant (Engineering Physics Laboratory), National University of Singapore, Singapore from 1st July 2007-1st January 2010

Responsibility: Teaching engineering physics experiments, designing experiments, conducting laboratory sessions, conducting viva and grading exam reports for undergraduate engineering students.

Research Interest:

- (a) Lithium-ion batteries for stationary and electric vehicle applications.
- (b) Sodium-ion batteries for grid/off-grid storage application.
- (c) Supercapacitors
- (d) Tunable magnetism
- (e) Magnetocaloric materials

Experimental experience:

(i) Research skills:

I am well experienced with many physical and chemical techniques for the synthesis of various nanostructured electrode materials for their energy storage applications (Both Lithium and sodium storage). I have experience on many physical characterization techniques such as X-ray diffraction, SEM, TEM, XAS, EDX, FT-IR, Raman spectroscopy, etc. During my Ph.D, I worked on various nanostructured metal oxides and chalcogenides for energy storage

applications, such as Li ion batteries. Electrodes made of such structured materials can absorb much more lithium than conventional electrodes and store much more energy. They can also minimize the charging time owing to their reduced dimension. I have developed various nanostructured electrode materials, which showed high and stable specific capacity (700-900 mA h g⁻¹), as well as high rate performance (~600 mA h g⁻¹ at 5000 mA g⁻¹). I have also studied the underneath reaction mechanism and the Li-ion transport kinetics associated with these electrode materials by using various analytical techniques. During my postdoctoral research, I have extended the work mainly to develop new electrode materials of high specific energy for the automobile industry. Currently, I am working on addressing the Li-ion reaction mechanism, nature of the electrode-electrolyte interface and battery degradation through in-situ and ex-situ characterization techniques. I am also working on high-specific energy cathode materials based on conversion reaction and optimizing their performance by preparing suitable nanostructures and various nanocomposites. I have developed nanocomposite cathode materials based on conversion reaction, which showed very high reversible capacity (~350 mA h g⁻¹ w.r.t. total weight of electrode materials). Apart from material development for energy storage and evaluating these materials in the Coin cell/Swagelok cell level, I have extended my expertise to develop and demonstrate a proto-type Li-ion battery of 3.0V; 2-10 Ah for electric vehicle applications. I have more than 3 years of experience working in the fabrication of Li-ion cells in pilot-scale. I have also extended my expertise of electrochemistry for tuning the magnetic properties of bulk materials for magnetic switching devices. In this respect, I have demonstrated spectacular change in magnetic properties of bulk materials by lithium intercalation.

(ii) Experience in lithium ion cell fabrication in pilot-plant scale:

- Slurry preparation (Optimization of Rheology and viscosity), Electrode fabrication
- Electrode calendaring, slitting, winding/stacking and Electrolyte filling
- Development of indigenous Lithium ion cell of 1-10 Ah
- Cell formation cycle, cell testing and safety evaluation

(iii) Hands-on experience in:

- Powder and thin film X-ray diffraction (XRD)
- Scanning Electron Microscopy (SEM)
- Transmission Electron Microscopy (TEM)
- Fourier-transform Infra-red Spectroscopy (FT-IR)
- Raman Spectroscopy
- Pulsed Laser Deposition

- RF- magnetron sputtering
- UV/Visible spectroscopy
- Electrochemical instruments for characterization (Bitrode, Arbin, Biologic, Zahner, Solatron Impedance analyzer, Autolab etc..)
- Physical Property Measurement System (PPMS)
- Thermal analysis Instrument (TGA/DSC)
- BET surface area Analyzer
- Density measurement for powder sample (Pycnometer)
- Basic experience in Atomic Force Microscopy, Transmission Electron Microscopy.

(iv) Materials preparation skills:

- Synthesis of micron- and nano- materials using different methods, like Ceramic routes, Carbo-thermal reduction, thermal nitridation, Solution methods: Urea combustion, Oxalate decomposition, Borohydride reduction, Sol-gel, Hydrothermal/Solvothermal synthesis, Microwave-assisted Sol-gel, Co-precipitation methods etc.
- Experience in growth metal oxides/nitride thin films by RF magnetron sputtering and pulsed laser deposition techniques.
- Experience in preparation of nanomaterials/ nanocomposites using high-energy ball milling (Spex).

(v) Software skills:

- Rietveld refinement (TOPAS software) to refine the X-ray data and obtain the crystal parameters.
- Material Data Studio, Diamond to draw the crystal structure from the crystallographic information file.
- WinXAS and Athena for X-ray absorption spectroscopy data.
- GATAN software for TEM data.
- Z-View and Z- plot for Impedance data.
- Regular use of computer for data analysis and data output with Widows and many other software, such as Origin, Excel, word etc.

Place: Chennai
Date: 30/05/2023

Bijoy Kumar Das
(Signature)