Name

Dr. M. B. Sahana

Designation

Sr. Scientist

Qualification

Ph.D.

Experience

1998 - 2004

PhD

Indian Institute of Science

2005 - 2005

Post-Doctoral Fellow

Stockholm University, Stockholm

2006 - 2010

Post-Doctoral Fellow

Wayne State University, Detroit, USA

2012-Current

Scientist

CAEM,

Research areas of interest

Electrode materials for lithium ion batteries, Microstructure Property Correlation, Solid state electrolyte lithium ion batteries, LIB cell manufacturing

Patent: " A process for in-situ carbon coating on alkali transition metal oxide"
Patent Application No. 201611007461, Date of filing: March 03, 2016, Inventor details: M. B. Sahana, S. Vasu, M. Sathiya, and R. Gopalan

Funded Project as principle invesitigator

1. High voltage carbon encapsulated-graded $LiMn_2O_4$:$LiNi_{1-x-y}Co_xAl_yO_2$ cathodes for rechargeable Li-ion pouch cells DST: 64.73 lakh 2018- 2021

PhD Supervised

1. "Structure and electrochemical property correlation of nano micro hierarchical structured $LiNi_{1-x-v}Co_xAl_vO_2$" N. Sasikala Department of Metallurgical and Materials Engineering, IIT Madras.
2. **Enhancement of cycle life of li-ion battery by in-situ carbon encapsulation on layered oxide based cathode materials S. Vasu,** Department of Metallurgical and Materials Engineering, IIT Madras.

Academic projects guided/ongoing

1. Optimization of composition of the anode for lithium ion batteries" Sreethika K.H M.Sc Physics 2018
2. Synthesis of Oxide-based Solid Electrolyte Li_4SiO_4, $Li_{4-x}Si_{1-x}Al_xO_4$ and $Li_{4-x}Si_{1-x}P_xO_4$ Rajanarayanan M.Tech Nano science and Technology 2019
3. Investigation into the fabrication of Hybrid solid electrolyte for lithium ion battery G Ebenezer Prasanna , Integrated MSc. 2019
4. Optimization of electrode coating for LiNi1-x-yCoxAlyO2 pouch cell fabrication Rany Selvam S B Tech in ceramic technology, 2018
5. Effect of particle size and composition on electrochemical performance of graphite anodes, Parvathavarthini A and Sandhiya . N M.Sc. Physics 2018
6. Optimization of pH during co-precipitation of LiNi1-x-yCoxAly(OH)2 layered double hydroxide synthesis; precursor for LiNi1-x-yCoxAlyO2, Lincy A M. Tech 2017
7. Synthesis and Investigation on Li-rich cathode materials for enhanced Li-ion batteries performance national Post Doctoral Fellow (SERB-DST) 2017
8. Investigation of Influence of reology of electrode slurry on electrochemical properties of LIB, K. Kumari, Ongoing PhD registerd at IIT Bombay
9. LiNi1-x-yCoxMnyO2 and LiMn2-xNixO4 composite cathode electrodes for lithium ion battery for electric vehicle application

List of publications

1. Comprehensive effort on electrode slurry preparation for better electrochemical performance of $LiFePO_4$ battery Kumari Konda, Sahana B. Moodakare, P. Logesh Kumar, Manjusha Battabyal, Jyoti R. Seth, Vinay A. Juvekar, Raghavan Gopalan, Journal of power sources, 480 (2020) 228837

2. Concentration Gradient-Driven Aluminum Diffusion in a Single-Step Coprecipitation of a Compositionally Graded Precursor for $LiNi_{0.8}Co_{0.135}Al_{0.065}O_2$ with Mitigated Irreversibility of H2 ↔ H3 Phase Transition, Sasikala Natarajan, Sahana B. Moodakare**,** Prathap Haridoss and Raghavan Gopalan, *ACS Appl. Mater. Interfaces* 2020, 12, 31, 34959–34970
3. Infrared Spectroscopy Signatures of Aluminum Segregation and Partial Oxygen Substitution by Sulfur in $LiNi_{0.8}Co_{0.15}Al_{0.05}O_2$ N. Sasiakala, M. B. Sahana, S. Vasu, P. Haridoss, and R. Gopalan, *ACS Appl. Energy Mater.*, 2018, *1* (6), pp 2536–2545
4. High temperature magnetic studies on $Bi_{1-x}Ca_xFe_{1-y}Ti_yO_{3-\delta}$ nanoparticles: Observation of Hopkinson-like effect above T_N, PSV Mocherla, D Prabhu, MB Sahana, NY Hebalkar, R Gopalan, MS Ramachandra Rao, C Sudakar, Journal of Applied Physics 124 (7), 073904
5. In-situ carbon encapsulation of LiNi1/3Co1/3Mn1/3O2 using pillared ethylene glycol trapped in the metal hydroxide interlayers for enhanced cyclic stability S Vasu, **M. B Sahana**, C Sudakar, R Gopalan, G Sundararajan Electrochimica Acta 251, 363-377
6. Microstrain engineered magnetic properties in $Bi_{1-x}Ca_xFe_{1-v}Ti_vO_{3-\delta}$ nanoparticles: deviation from Néel's 1/d size-dependent magnetization behaviour, Pavana S. V Mocherla, **M. B Sahana,** R. Gopalan, M.S Ramachandra Rao, B. R. K Nanda, C. Sudakar, Materials Research Express 4 (10), 106106, 2017
7. Raman spectral signature of Mn-rich nanoscale phase segregations in carbon free $LiFe_{1-x}Mn_xPO_4$ prepared by hydrothermal technique,

   M. B. Sahana, S. Vasu, N. Sasikala, S. Anandan, H. Sepehri-Amin, C. Sudakar and R. Gopalana, RSC Adv., 4, 2014, 64429
8. Quantum confinement effects and band gap engineering of SnO_2 nanocrystals in a MgO matrix

   M.B. Sahana, C. Sudakar, A. Dixit, J.S. Thakur, R. Naik, V.M. Naik,

   Acta Materialia, 60(3) 2012, 1072-1078.
9. Nanostructured high specific capacity C-$LiFePO_4$ cathode material for lithium-ion batteries

   K. Bazzi, K.S Dhindsa, A. Dixit, **M.B. Sahana**, C. Sudakar, M. Nazri, ZX.Zhou, P. Vaishnava, V.M Naik, G.A. Nazri, R. Naik,

   J. Mater. Res. (2012), 424-430.
10. Regulation of Polar Peptidoglycan Biosynthesis by Wag31 Phosphorylation in Mycobacteria

    C. Jani, H. Eoh, JJ Lee, K Hamasha, **M.B. Sahana**, J.S. Han, S. Nyayapathy, J.Y. Lee, J.W Suh, S.H. Lee, S.J Rehse, D.C. Crick, C.M. Kang,

    BMC Microbiology 10 Art No. 327, (2010).

11. The effect of Wag31 phosphorylation on the cells and the cell envelope fraction of wild-type and conditional mutants of Mycobacterium smegmatis studied by visible-wavelength Raman spectroscopy,
    K. Hamasha, **M.B. Sahana**, C. Jani, S. Nyayapathy, C.M Kang, and S. J. Rehse. *Biochemical and Biophysical Research communications*, (2010)
    391, 664-668.
12. Coexistence of anion and cation vacancy defects in vacuum-annealed In_2O_3 thin films,
    C. Sudakar, A. Dixit, Sanjiv Kumar, **M.B. Sahana**, G. Lawes, R. Naik and V.M. Naik,
    Scripta Materialia 62(2), 63 (2010).
13. The effect of titanium on the lithium intercalation capacity of V_2O_5 thin films'
    M.B. Sahana, C. Sudakar, C. Thapa, V.M. Naik, G.W. Auner, R. Naik and K.R. Padmanabhan '*Thin Solid Films*, (2009), 24, 6642-6651.
14. Structural, magnetic, and electrical studies on polycrystalline transition metal doped $BiFeO_3$ thin films",
    P. Kharel, S. Talebi, B. Ramachandran, A. Dixit, V.M. Naik, **M.B. Sahana**, C. Sudakar, R. Naik, M.S.R. Rao, G. Lawes,
    J. Phys. Cond. Matter. (2009) 21 036001.
15. Band Gap Engineering by Tuning Particle Size and Crystallinity of Sn_{O2}-F_{e2O3} Nanocrystalline Composite Thin Films,
    M.B. Sahana, C. Sudakar, G. Setzler, A. Dixit, J.S. Thakur, G. Lawes, R. Naik, V.M. Naik, and P.P. Vaishnava, *Applied Physics Letters*, (2008), 93(23), 231909/1-231909/3.
16. Guiding Of Highly-Charged Ions Through Insulating Nano-Capillaries,
    R. Schuch, **M.B. Sahana**, I. L. Soroka, Gy.Vikor, R. T. Kumar, Z. Hongqiang, A. Johansson and P. Skog,
    Canadian journal of physics, (2008), 86, 327-330.
17. Influence of the stoichiometry of V_2O_5 thin films on electrochemical properties,
    M.B. Sahana, C. Sudakar, G. Lawes, V.M. Naik, Ron Baird, G.W. Auner, K. R. Padmanabhan, and R.Naik,

Materials Science and Engineering B, (2007), 143 42-50.

18. Ion implantation and ion beam analysis of MOD deposited oxide films,
    X. Marko, P. Talagala, **M.B. Sahana**, R. Naik, K.R .Padmanabhan, C. P. Marques, E. Alves, Nuclear Instruments & Methods in Physics Research, Section B: *Beam Interactions with Materials and Atoms* , (2007), 261, 456-460.
19. Guiding of highly charged ions by highly ordered SiO_2 nanocapillarie
    M.B. Sahana, P. Skog, Gy. Vikor, R. T. Rajendra Kumar, R. Schuch,
    Physical Review A: *Atomic, Molecular, and Optical Pysics* , (2006), 73, 040901/1-040901/4.
20. Metalorganic chemical vapor deposition of highly oriented thin film composites of V_2O_5 and V_6O_{13}: Suppression of the metal-semiconductor transition in V_6O_{13}
    M.B. Sahana, S. A. Shivashankar,
    Journal of Materials Research, (2004), 19, 2859-2870.
21. Growth of nanowires of β -Na_{xV2O5} by metalorganic chemical vapor deposition
    M.B. Sahana, S. A. Shivashankar,
    Journal of Materials Chemistry, (2003), 13, 2254-2260.
22. Phase transformation and semiconductor-metal transition in thin films of VO_2 deposited by low-pressure metalorganic chemical vapor deposition
    M.B. Sahana, G. N Subbanna, S.A Shivashankar,
    Journal of Applied Physics, 92, (2002),6495-6504.
23. Microstructure and properties of VO_2 thin films deposited by MOCVD from vanadyl acetylacetonate
    M.B. Sahana, M.S. Dharmaprakash, S.A. Shivashankar,
    Journal of Materials Chemistry, (2002), 12, 333-338.
24. Room temperature ferromagnetism in Cr-doped In_2O_3 on high vacuum annealing of thin films and bulk sample
    P. Kharel, C. Sudakar, **M.B. Sahana**, G. Lawes, R. Suryanarayanan, R.Naik, V. M. Naik, J*ournal of Applied Physics* (2007), 101, 09H117.
25. 'Time evolution of the microstructure of VO_2(B) films deposited on glass by MOCVD'.
    M. B. Sahana, G. N. Subbanna, and S. A.Shivashankar,

Mater. Research society symposium proceedings, vol. 749, 2003, W.5.14,

26. 'Transmission of slow Ne7+ ions through nanocapillaries'

    M. B. Sahana, P. Skog, Gy. Vikor, R.T. Rajendra kumar, and R. Schuch,

    Book of Inv. Papers, *Intern. Conf. on Photonic, Electronic, and Atomic Collisions*,

<u>Annexure 2:</u> Invited Seminar/Colloquia

June 17-19, 2016 Indo-US Workshop on Analysis of Multiphysics Phenomena in Li-ion Cells. Indian Institute of Technology (IIT), Bombay India "Layered lithium - mixed transition metal oxide cathodes for lithium ion batteries"

Feb 19-22, 2015 **7th IndoGFOE Symposium –, Agra, India** Batteries for Electric Vehicles: Present and Future

March 2015 - ***VIT University, Vellore*** **Na*tional conference on energy materials*** *Lithium ion batteries*

December 17 2012 Workshop on Physics Education and Research, Department of Physics, Indian Institute of Technology Madras, Chennai " Physics of energy storage materials"

Feb 11, 2010 **General Motors Global R&D centre, Mi, USA,** " Nanostrucutred Cathode materials for Lithium ion batteries"

Nov 11, 2009 Department of Physics, Wayne State University, MI, USA, "Structure property correlation of Cathode materials for Lithium ion batteries."

Feb, 2007 Physics Department, Wayne State University, **MI, USA,** "Guiding of Highly-charged Ions through Insulating Nanocapillaries"

Dec 4, 2006 Physics Department, Western Michigan University, Kalamazoo, MI, USA, "Guiding of Highly-charged Ions through Insulating Nanocapillaries"

July 2005 XXIV ICPEAC 2005 Rosario ARGENTINA "Special report: Transmission of slow Ne^{7+} ions through nanocapillaries"

<u>Annexure 3: Presentation at Conference</u>

1. Oral presentation of the paper entitled Structure electrochemcial property correlation of carbon free Mn doped $LiFePO_4$ prepared by hydrothermal method"

   M. B. Sahana, R. Prakash, T. Mohan, T. Rajappa, R. Gopalan, and G. Sundararajan, 2nd International Conference on Materials for Energy, EnMat II, Karlsrue/Germany from May 12-17, **2013** .

2. Poster presentation of the paper entitled "Electrical and electrochemical characterization of nano-sized $LiFePO_4$ cathode materials synthesized by a lauric acid-based sol--gel method"

   Khadije Bazzi, Ambesh Dixit, **M. B. Sahana**, C. Sudakar, M. Nazri P. P. Vaishnava, V. Naik, G. A. Nazri, R. Naik American Physical Society Meeting, March 21-25, 2011, Dallas, Texas, USA
3. Oral presentation of the paper entitled "Quantum confinement effects in nanocrystals of SnO_2 in MgO matrix "

   M.B. Sahana C. Sudakar A. Dixit J.S. Thakur R. Naik V.M. Naik

   American Physical Society Meeting, March 21-25,2011, Dallas, Texas, USA
4. Oral presentation of the paper entitled "Magnetic and spectroscopic characterization of C-LiFePO4nanoparticles for cathode material for Li ion batteries"

   Ambesh Dixit K. Bazzi **M.B. Sahana** C. Sudakar M. Nazri P.P. Vaishnava V. Naik V.K. Garg A.C. Oliveira G.A. Nazri, R. Naik

   American Physical Society Meeting, March 21-25,2011, Dallas, Texas, USA.
5. Oral presentation of the paper entitled "Structural and electrochromic properties of $M_2(SO_4)_3$, with M = (Cr, Fe, V) nanostructures prepared by template assisted electrodeposition method"

   M.B. Sahana, Sudakar Chandran Ratna Naik Vaman Naik American Physical Society Meeting, Portland, March 15-19, 2010 Portland, USA
6. Poster presentation of the paper entitled "Structural, optical and electrochemical properties of SnO2−*x* thin films

   Rohan Bandekar, **M.B. Sahana**, Sudakar Chandran Ratna Naik, Vaman M. Naik, American Physical Society Meeting, Portland, March 15-19,2010 Portland, USA
7. Oral presentation of the paper entitled " Electrical and magnetic properties of BiFeO3-CoFe2O4nanotube composite"

   C. Sudakar, A. Dixit, **M.B. Sahana**, G. Lawes, R. Naik, V. M. Naik

   American Physical Society Meeting, Portland, March 15-19, 2010, Portland, USA
8. Oral presentation of the paper entitled ''Structural and electrochemical properties of V_2O_5 and $Ag_xV_2O_5$ nanowries prepared by template assisted method'

   M.B. Sahana, C. Sudakar, R. Naik, V.M. Naik

American Physical Society Meeting, Portland, March 15-19, 2010, Portland, USA

9. Poster presentation of the paper entitled "Effect Of Oxygen Nonstoichiometry Of Electrochemical Properties Of V_2O_5 Thin Films"

   M.B. Sahana, C. Sudakar, C. Thapa, G. Lawes, G.W. Auner K.R. Padmanabhan R. Naik, V.M. Naik

   American Physical Society Meeting, New Orleans, USA Mar 10-14, 2008

10. Poster presentation of the paper entitled "Influence of stoichiometry of V2O5 thin films on the electrochemical properties "

    M.B. Sahana, C. Sudakar, C. Thapa, G. Lawes, R. Baird, G.W. Auner K.R. Padmanabhan R. Naik, V.M. Naik

    American Physical Society Meeting, March 5-9, Denver, Colorado, USA

11. Oral presentation of the paper entitled "Synthesis and Characterization and Gas Sensing Properties of SnO2-xFe2O3(x = 0 to 1) Thin Films" G. Setzler

    C. Sudakar **M.B. Sahana** P.P. Vaishnava Ron Baird G.W. Auner G. Lawes R. Naik, V.M. Naik

    American Physical Society Meeting, March 5-9, Denver, Colorado, USA

12. Oral presentation of the paper entitled "Influence of stoichiometry of V_2O_5 thin films on the electrochemical properties"

    M.B. Sahana, G. Lawes, K. R. Padmanabhan, R. Naik, V.M Naik

    20th International Conference on Raman Spectroscopy Yokohama, Japan, 20–25 Aug 2006.

13. Oral presentation of the paper entitled "Structural, Optical, and Electrochromic Properties of V_2O_5 Thin Films"

    M.B. Sahana, G. Lawes, K. R. Padmanabhan, R. Naik, V.M Naik

    American Physical Society Meeting, Baltimore,USA, Mar 13-17 2006

14. Oral presentation of the paper entitled "Structural, Optical, and Electrochromic Properties of V_2O_5 Thin Films "

    M.B. Sahana, G. Lawes, K. R. Padmanabhan, R. Naik, V.M Naik

    Spring meetings of Ohio Section of the American Physical Society (OSAPS) and the Michigan Section of the American Association of Physics Teachers (MAAPT), Detroit, Michigan, USA, March 31 to April 12006.

15. Oral presentation of the paper entitled "Guiding of highly charged ions by SiO_2 nanocapillaries"

    Sep 2005 3rd Conference on Elementary Processes in Atomic Systems (CEPAS2005)

16. Oral presentation on Special report: Transmission of slow Ne^{7+} ions through nanocapillaries"

    M.B. Sahana, P. Skog, Gy. Vikor, R. T. Rajendra Kumar, R. Schuch,

    20-26 July 2005 XXIV ICPEAC 2005 Rosario ARGENTINA

17. " Poster presentation of paper entitled "Time evolution of the microstructure of VO_2(B) films deposited on glass by MOCVD

    M.B. Sahana and S. A. Shivashankar

    Dec 2-5 2002 MRS Fall meeting 2002, Boston, USA,. Mater. Research symposium

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