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A. PROFESSIONAL PREPARATION

<u>College/University</u>	<u>Major</u>	<u>Degree &Year</u>
University of Calcutta, West Bengal	Chemistry	BS, 1997
Indian Institute of Science, Bangalore	Chemical Sciences	MS, 1999
Indian Institute of Science, Bangalore	Nanomaterials	PhD, 2004
Colorado State University, Post Doc.	Nanomaterials	2004-2008

B. ACADEMIC/PROFESSIONAL APPOINTMENTS:

Sept. 2015 - : Associate Professor, Department of Chemistry, Missouri S&T, Rolla, MO.

Sep 2015 - : Adjunct Associate Professor, Materials Science & Engineering Department, Missouri S&T, Rolla, MO.

Aug. 2008 to Aug. 2015: Assistant Professor, Chemistry, Missouri S&T, Rolla, Missouri.

C. CURRENT RESEARCH ACTIVITIES

- Developing novel high-performance electrocatalysts for water oxidation/reduction and full water splitting at low overpotentials.
- Patterned growth of vertically ordered nanowire arrays through confined electrodeposition and their integration into devices like photovoltaics, energy generation and storage, thermoelectric, sensorial and other electronic devices.
- Developing novel catalysts for conversion of atmospheric carbon dioxide to value-added chemicals.
- Designed synthesis of multi-functional magnetic nanomaterials for biomedical (magnetic fluid hyperthermia), catalysis and sensorial applications.
- Synthesis, characterization and property studies of superconducting nanostructures and investigation of the effect of interfacial pressure and confinement on the properties of Fe-based superconductors.

D. PUBLICATIONS

Total Citations – 7184; h-index - 34

Selected publications from Missouri S&T:

1. Saxena, A.; Singh, H.; Nath, M. Cobalt Telluride Electrocatalyst for Selective Electroreduction of CO₂ to Value-added Chemicals, (*invited contribution*) *Materials for Renewable and Sustainable Energy*, **2022**, *11*, 115-129.
2. Singh, H.; Liyanage, W. P. R.; Nath, M. Carbon nanotube encapsulated metal selenide nanostructures for efficient electrocatalytic oxygen evolution reaction, *Chem. Commun.* **2022**, *58*, 8360-8363.

- Saxena, A.; Liyanage, W. P. R.; Kapila, S.; Nath, M. Nickel Selenide as Efficient Electrocatalyst for Selective Reduction of Carbon Dioxide to Carbon-rich Products, *Catal. Sci. Tech.* **2022**, *12*, 4727-4739.
- Singh, H.; Saxena, A.; Nath, M. Progress of transition metal chalcogenides as efficient electrocatalysts for energy conversion, (*invited contribution*) *Current Opinion in Electrochemistry*, **2022**, *34*:100993.
- Singh, H.; Mckenzie, M. H.; Chakravarty, S.; Nath, M. Multi-walled carbon nanotube supported manganese selenide as a highly active bifunctional OER and ORR electrocatalyst, *J. Mater. Chem. A* **2022**, *10*, 6772-6784.
- Nath, M.; De Silva, U.; Singh, H.; Perkins, M.; Liyanage, W. P. R.; Umapathi, S.; Chakravarty, S.; Masud, J. Cobalt Telluride: A Highly Efficient Trifunctional Electrocatalyst for Water Splitting and Oxygen Reduction. *ACS Appl. Energy Mater.* **2021**, *4*, 8158-8174.
- Singh, H.; Bernabe, J.; Chern, J.; Nath, M. Copper selenide as multifunctional non-enzymatic glucose and dopamine sensor, (*invited contribution*), *J. Mater. Res.* **2021**, *36*, 1413-1424.
- Abdullahi, I.; Masud, J.; Ioannou, P.; Ferentinos, E.; Kyritsis, P.; Nath, M. A Molecular Tetrahedral Cobalt-Seleno-Based Complex as an Efficient Electrocatalyst for Water Splitting, (*invited contribution*), *Molecules* **2021**, *26*, 945.
- Saxena, A.; Liyanage, W. P. R.; Masud, J.; Kapila, S.; Nath, M. Selective electroreduction of CO₂ to carbon-rich products with a simple binary copper selenide electrocatalyst, *J. Mater. Chem. A* **2021**, *9*, 7150-7161.
- De Silva, U.; See, J.; Liyanage, W. P. R.; Masud, J.; Wu, J.; Yang, W.; Chen, W.; Prendergast, D.; Nath, M. Understanding the Structural Evolution of a Nickel Chalcogenide Electrocatalyst Surface for Water Oxidation, *Energy & Fuels* **2021**, *35*, 4387-4403.
- Umapathi S, Singh H, Masud J, Nath M. Nanostructured copper selenide as an ultrasensitive and selective non-enzymatic glucose sensor, *Mater. Adv.* **2021**, *2*, 927-932.
- Umapathi, S.; Masud, J.; Coleman, H.; Nath, M. Electrochemical sensor based on CuSe for determination of dopamine, *Microchim Acta*, **2020**, *187*, 440.
- Cao, X.; Medvedeva, J. E.; Nath, M. Copper Cobalt Selenide as a High-Efficiency Bifunctional Electrocatalyst for Overall Water Splitting: Combined Experimental and Theoretical Study, *ACS Applied Energy Materials* **2020**, *3*, 3092 – 3103.
- Liyanage, W. P. R.; Nath, M. CuInSe₂ nanotube arrays for efficient solar energy conversion, *Scientific Reports*, **2019**, *9*:16751.
- Amin, B. G.; Masud, J.; Nath, M. Facile one-pot synthesis of NiCo₂Se₄-rGO on Ni foam for high performance hybrid supercapacitors, *RSC Advances*, **2019**, *9*, 37939-37946.
- Amin, B. G.; Desilva, U.; Masud, J.; Nath, M. Ultrasensitive and Highly Selective Ni₃Te₂ as a Nonenzymatic Glucose Sensor at Extremely Low Working Potential, *ACS Omega*, **2019**, *4*, 11152-11162.
- Cao, X.; Johnson, E.; Nath, M. Expanding Multinary Chalcogenide based High-Efficiency Oxygen Evolution Electrocatalyst through Combinatorial Electrodeposition: Case Study with Fe-Cu-Co Phases, *ACS Sustainable Chem. Eng.* **2019**, *7*, 9588-9600.

18. Cao, X.; Johnson, E.; Nath, M. Identifying High-efficiency Oxygen Evolution Electrocatalysts from Co-Ni-Cu Based Selenides through Combinatorial Electrodeposition, *J. Mater. Chem. A*, **2019**, *7*, 9877.
19. Amin, B. G.; Masud, J.; Nath, M. A non-enzymatic glucose sensor based on a CoNi₂Se₄/rGO nanocomposite with ultrahigh sensitivity at low working potential, *J. Mater. Chem. B*, **2019**, *7*, 2338-2348.
20. Masud, J.; Liyanage, W. P. R.; Cao, X.; Saxena, A.; Nath, M. Copper Selenides as High-efficiency Electrocatalysts for Oxygen Evolution Reaction, *ACS Applied Energy Materials*, **2018**, *1*, 4075-4083.
21. Cao, X.; Hong, Y.; Zhang, N.; Chen, Q.; Masud, J.; Zaeem, M. A.; Nath, M. Phase Exploration and Identification of Multinary Transition Metal Selenides as High-efficiency Oxygen Evolution Electrocatalysts through Combinatorial Electrodeposition, *ACS Catalysis*, **2018**, *8*, 8273-8289.
22. DeSilva, U.; Masud, J.; Zhang, N.; Hong, Y.; Liyanage, W. P. R.; Zaeem, M. A.; Nath, M. Nickel telluride as a bifunctional electrocatalyst for efficient water splitting in alkaline medium, *J. Mater. Chem. A*, **2018**, *6*, 7608-7622.
23. Arivu, M.; Masud, J.; Umaphathi, S.; Nath, M. Facile synthesis of Ni₃B/rGO nanocomposite as an efficient electrocatalyst for the oxygen evolution reaction in alkaline media, *Electrochem. Commun.* **2018**, *86*, 121-125.
24. Abedin, M. R.; Umaphathi, S. U.; Mahendrakar, H.; Laemthong, T.; Coleman, H.; Muchangi, D.; Santra, S.; Nath, M.; Barua, S. Polymer coated gold-ferric oxide superparamagnetic nanoparticles for theranostic applications, *J. Nanobiotechnol.* **2018**, *16*, 80.
25. Umaphathi, S.; Masud, J.; Swesi, A.; Nath, M. FeNi₂Se₄-Reduced Graphene Oxide Nanocomposite: Enhancing Bifunctional Electrocatalytic Activity for Oxygen Evolution and Reduction through Synergistic Effects, *Adv. Sustain. Sys.* **2017**, *1*, 1700086.
26. Swesi, A. T.; Masud, J.; Liyanage, W. P. R.; Umaphathi, S.; Bohannan, E.; Medvedeva, J. E. M.; Nath, M. Textured NiSe₂ Film: Bifunctional Electrocatalyst for Full Water Splitting at Remarkably Low Overpotential with High Energy Efficiency, *Sci. Report* **2017** article no. 2401, doi: 10.1038/s41598017-02285-z.
27. Golrokh Amin, B.; Swesi, A. T.; Masud, J.; Nath, M. CoNi₂Se₄ as an efficient bifunctional electrocatalyst for overall water splitting, *Chem. Commun.* **2017**, *53*, 5412.
28. Liyanage, W. P. R.; Nath, M. CdS-CdTe Heterojunction Nanotube Arrays for Efficient Solar Energy Conversion, *J. Mater. Chem. A*, **2016**, *4*, 14637-14648.
29. Swesi, A.; Masud, J.; Nath, M. Nickel selenide as a high-efficiency catalyst for oxygen evolution reaction, *Energy and Environ. Sci.* **2016**, *9*, 1771.
30. Swesi, A.; Masud, J.; Nath, M. Enhancing Electrocatalytic Activity of Bifunctional Ni₃Se₂ for Overall Water Splitting through Etching-induced Surface Nanostructuring, *J. Mater. Res.*, **2016**, *31*, 2888-2896.
31. Masud, J.; Ioannou, P. C.; Levesanos, N.; Kyritsis, P.; Nath, M. A Molecular Ni Complex Containing Tetrahedral Nickel Selenide Core as Highly Efficient Electrocatalyst for Water Oxidation, *Chem. Sus. Chem.* **2016**, *9*, 3128-3132.

32. Masud, J.; Nath, M. Co₇Se₈ Nanostructures as Catalysts for Oxygen Reduction Reaction with High Methanol Tolerance, *ACS Energy Lett.*, **2016**, *1*, 27-31.
33. Masud, J.; Umapathi, S.; Ashokaan, N.; Nath, M. Iron Phosphide Nanoparticles as an Efficient Electrocatalyst for OER in Alkaline Solution, *J. Mater. Chem A*, **2016**, *4*, 9750-9754.
34. Masud, J.; Swesi, A.; Liyanage, W. P. R.; Nath, M. Cobalt Selenide Nanostructures: An Efficient Bifunctional Catalyst with High Current Density at Low Coverage, *ACS Appl. Mater. Interfaces*, **2016**, *8*, 17292.
35. De Silva, U.; Liyanage, W. P. R.; Nath, M. Magnetic Multifunctional Nanostructures as High-efficiency Catalysts for Oxygen Evolution Reactions, *MRS Advances*, **2016**, doi: [10.1557/adv.2016.399](https://doi.org/10.1557/adv.2016.399).
36. Levesanos, N.; Liyanage, W. P. R.; Ferentinos, E.; Raptopoulos, G.; Paraskevopoulou, P.; Sanakis, Y.; Choudhury, A.; Stavropoulos, P.; Nath, M.; Kyritsis, P. Investigating the Structural, Spectroscopic, and Electrochemical Properties of [Fe {(EPiPr)₂ 2N} ₂](E= S, Se) and the Formation of Iron Selenides by Chemical Vapor Deposition, *Eur. J. Inorg. Chem.* **2016**, *34*, 5332-5339.
37. Liyanage, W. P. R.; Wilson, J.; Kinzel, E.; Durant, B.; Nath, M. Fabrication of CdTe Nanorod Arrays over Large Area Through Patterned Electrodeposition for Efficient Solar Energy Conversion, *Sol. Energy Mater. Sol. Cells*, **2015**, *133*, 260-267.
38. Nath, M.; Liyanage, W. P. R. Electrodeposition of highly ordered CdTe nanotube/nanorod arrays for solar energy conversion, *ECS Trans.*, **2015**, 66.
39. Desai, P.; Ashokaan, N.; Masud, J.; Nath, M. Synthesis and magnetic properties of superparamagnetic CoAs nanostructures, *Mater. Res. Exp.* **2015**, *2*, 036102.
40. Desai, P.; Nath, M. Generalized Protocol for the Synthesis of Transition Metal Arsenides, *J Nanomater.* **2015**, Volume 2015, Article ID 362152
41. Liyanage, W.; Wilson, J. S.; Kinzel, E.; Nath, M. Patterned Electrodeposition of CdTe Nanotube and Nanorod Arrays for Solar Cells, *Nanomaterials and Energy* Manuscript id: NME-D-14-00011 **2014** DOI: [10.1680/nme.14.00011](https://doi.org/10.1680/nme.14.00011).
42. Liyanage, W. P. R.; Mishra, S.; Song, K.; Nath, M. Fabrication of Multifunctional Ferromagnetic Au₃Pd-CoSe Nanoparticles, *RSC Adv.* **2014**, *4*, 28140-28147
43. Mishra, S.; Song, K.; Ghosh, K. C.; Nath, M. Enhancement of Superconducting T_c (33 K) by Entrapment of FeSe in Carbon Coated Au-Pd₁₇Se₁₅ Nanoparticles, *ACS Nano* **2014**, *8*, 2077.
44. Pariti, A.; Desai, P.; Maddirala, S. K. Y.; Ercal, N.; Katti, K. V.; Liang, X.; Nath, M. Superparamagnetic Au-Fe₃O₄ Nanoparticles: One-pot Synthesis, Biofunctionalization and Toxicity Evaluation, *Mater. Res. Exp.* **2014**, *1*, 035023 (1-19).
45. Mishra, S.; Song, K.; Koza, J. A.; Nath, M. Synthesis of Superconducting Nanocables of FeSe Encapsulated in Carbonaceous Shell, *ACS Nano* **2013**, *7*, 1145.
46. Desai, P.; Koza, J.; Song, K.; Pariti, A.; Nath, M. Soft-chemical Synthetic Route to Superparamagnetic FeAs@C Core-Shell Nanoparticles Exhibiting High Blocking Temperature, *Chem. Mater.* **2013**, *25*, 1510-1518.

47. Mishra, S.; Nath, M. Growth of Vertically Aligned CdTe Nanorod Arrays through Patterned Electrodeposition, *Nano Energy* **2013**, 2, 1207-1213.

Invited Book Chapters

1. Multifunctional Magnetic Nanomaterials for Diverse Applications, **M Nath *Nanotechnology: Delivering on the Promise*, Volume 2**, 139-166, published by American Chemical Society, **2016**.

E. RESEARCH GRANTS AND CONTRACTS:

Current (2016 –)

2022 – 2025: “CAS: Understanding Structural Metamorphosis of Transition Metal Chalcogenide Electrocatalyst Interfaces” PI 80%; Agency NSF (CHE); Funds awarded: \$379,583; Period: 08/01/22 – 07/31/25.

2021 – 2024: “Designing Efficient Electrocatalysts for Selective Reduction of CO₂ to Carbon-Rich Products”, PI 80%. Agency: NSF; Funds awarded: \$548,698; Period: 10/01/21 – 09/30/24.

2022 – 2023: “INTERN DCL: CAS: Designing Efficient Electrocatalysts for Selective Reduction of CO₂ to Carbon-Rich Products”, NSF(CHE) Supplemental Funds; PI 100%; Funds awarded: \$54,972; Period – 06/01/22 – 11/30/2022.

2017 - 2022: “Investigating Mixed Metal Chalcogenides for Electrocatalytic Water Oxidation: An Integrated Experimental and Theoretical Approach towards Materials Innovation”; PI 75%. Agency: NSF; Funds awarded: \$522,443; Period: 08/01/17 – 07/31/22.

2018 – 2020: “Investigating Mixed Metal Chalcogenides for Electrocatalytic Water Oxidation: An Integrated Experimental and Theoretical Approach towards Materials Innovation”; Supplemental Funds; PI 100%. Agency: NSF; Funds awarded: \$72,000.

2016: “Multifunctional Magnetic Nanomaterials for Early Detection and Treatment of Cancer”; PI 100%; Missouri Innovators Grant; Funds awarded: \$35,000; Period: 03/01/16 – 02/28/18.

Pending

2023 – 2025: “Converting CO₂ in Flue Gas and Alkaline Solid Wastes to Carbon-Negative Alternative Cement for Precast Concrete Units”; co-PI 50%; Agency: DOE; Funds requested: \$924,998; Period: 04/01/2023 – 03/31/2025.

Recently Completed

- “Study of Transition Metal Chalcogenide Nanostructures As Efficient Oxygen Reduction Catalysts” (grant # 54793-ND10); PI 100%; ACS Petroleum Research Funds (New Directions). Funds awarded: \$110,000; Period: 09/01/14 – 08/31/17.

- “MRI: Acquisition of an Electron-beam Lithography System for Nanofabrication and Nanoscience Research and Education (grant # 0044770)”; co-PI 20%; NSF Major Research Instrumentation; Funds awarded: \$840,000; Period: 09/01/15 – 08/31/17.
- “Designed Growth of Superparamagnetic Nanostructures and Optimizing their Hyperthermia Efficiency”; PI 100%. University of Missouri Research Board; Funds awarded: \$23,500; Period: 01/01/16 – 12/31/16
- “Designing High Efficiency Solar-to-Fuel Energy Conversion Systems by Combining Nanotube Photovoltaics with Water Oxidation Catalysts” PI 100%; ERDC, Missouri S&T, Funds Awarded: \$10,000; Period: Aug2016 – June 2017.
- “Water Splitting Catalysts by Design: Investigating Transition Metal Chalcogenides” PI 100%; ERDC, Missouri S&T, Funds Awarded: \$20,000; Period: Aug2015 – June 2016.
- “Synthesis of Robust Nanostructured Borides and Carbides for Smart Applications under Extreme Environments”, PI 40%; CASB; Funds Awarded: \$20,000; Period: July 2016 – May 2017.
- “Synthesis of Complex Nanowires and Their Arrays through Layer-by-Layer Electrodeposition on Patterned Nanoelectrodes for Efficient Micro Power Generators” UM Research Board, PI 100%; Jan 2013 – Jan 2014, \$25,000.
- “Superconducting Nanowires form the pnictide-oxide family” PI 100%, UM Research Board, September 2009 – Dec 2010, \$22,000.
- MRC Young Investigator Award, Missouri S&T, August 2011 – June 2012, \$10,500.
- MRC Young Investigator Award, Missouri S&T, August 2009 – June 2010, \$15,000.

F. CONFERENCE PRESENTATIONS & INVITED TALKS

Invited Talks

- **M. Nath**, Designing Smart Functional Materials for Energy Conversion, Storage and Sensing: The Story of Transition Metal Chalcogenides, Faculty Development Program at SRM University, India, March 2022.
- **M. Nath**, Designing Smart Materials to Mitigate Environmental Concerns, Citizen’s Climate Lobby, Rolla, MO, February 2022.
- **M. Nath**, A. Saxena, H. Singh, U. De Silva, W. P. R. Liyanage, J. Masud (Invited) Slurry of Transition Metal Chalcogenides for Multifaceted Electrochemical Applications: Energy Conversion, Storage, Sensing & Catalysis. ECS Meeting Abstracts. 2021 May 30; MA2021-01(45):1769-1769.
- **M. Nath**, “Designing Smart Materials for Energy Conversion, Storage and Sensing”, Pittsburg State University, **2020**.
- **M. Nath**, “Slurry of Transition Metal Chalcogenides for Energy Conversion, Storage and Sensing, UC Davis, Davis, **2019**.
- **M. Nath**, “Designing Smart Materials for Efficient Energy Conversion: The Story of Transition Metal Chalcogenides” University of Missouri, St. Louis, **2017**.

- **M. Nath**, “Designing Smart Materials for Efficient Energy Conversion: The Story of Transition Metal Chalcogenides”, Pittsburg State University, Pittsburg, Kansas, March **2017**.
- **M. Nath**, “Synthesis of Core-shell type FeSe Nanomaterials Encapsulated in Carbon” **57th Midwest Solid State Conference**, University of Kansas, **2013**.
- **M. Nath**, “Designing Functional Nanomaterials for a Plethora of Smart Applications” **4th Annual Nanofrontiers Symposium**, University of Missouri, Columbia, **2013**.
- **M. Nath**, “Functional Nanomaterials: From Superparamagnets to Superconductors” **Physics Colloquium**, Missouri State University, Springfield, **2012**.
- **M. Nath**, “Innovative Synthesis of Functional Nanomaterials: From Superparamagnets to Superconducting Nanostructures” **Missouri Inorganic Day 2012**, University of Missouri, St. Louis.
- **M. Nath**, “Functional Nanomaterials” **Chemical Engineering Departmental Seminar**, Missouri S&T, **2009**.

Conference Presentations

- **M. Nath**, Transition Metal Chalcogenides: New kids on the block, Electrochemistry Gordon Research Conferences, Venture, California, Sept 11th – Sept 16th, 2022
- **M. Nath**, Transition Metal Chalcogenides: From Sensors to Electrocatalysts for Energy Conversion, Solid State Gordon Research Conferences, Colby Sawyer College, New Hampshire, July 24 – July 29th, 2022.
- **Singh H**, Liyanage W, Nath M. Carbon Nanotube Encapsulated Metal Selenide Electrocatalyst for Oxygen Evolution Reaction. ECS Meeting Abstracts. 2021 May 30; MA2021-01(38):1200-1200.
- **Nath M**, Saxena A, Singh H, De Silva U, Liyanage W, Masud J. (Invited) Slurry of Transition Metal Chalcogenides for Multifaceted Electrochemical Applications: Energy Conversion, Storage, Sensing & Catalysis. ECS Meeting Abstracts. 2021 May 30; MA2021-01(45):1769-1769.
- Singh H, Nath M. Multifunctional Nanostructured Metal Selenides for Non-Enzymatic Electrochemical Sensors: Dopamine and Glucose Detection. ECS Meeting Abstracts. 2021 May 30; MA2021-01(47):1908-1908.
- S Umapathi, J Masud, AT Swesi, **M Nath**, “FeNi₂Se₄–Reduced Graphene Oxide Nanocomposite: Enhancing Electrocatalytic Activity for Water Oxidation through Synergistic Effects” **ECS Meeting Abstracts 2017/9/1**, 1636-1636.
- **M Nath**, “Highly Efficient Water Splitting with Nickel Telluride: A Novel Bifunctional Electrocatalyst in Alkaline Medium” **231st ECS Meeting (May 28-June 1, 2017)**.
- U De Silva, WPR Liyanage, J Masud, M Nath, “Highly Efficient Water Splitting with Nickel Telluride: A Novel Bifunctional Electrocatalyst in Alkaline Medium” **ECS Meeting Abstracts 2017/4/15**, 1422-1422.
- X Cao, Q Chen, J Masud, **M Nath**, “Combinatorial Synthesis of High-Efficiency Transition Metal Selenides As Oxygen Evolution Electrocatalysts” **ECS Meeting Abstracts 2017/4/15**, 1765-1765.

- **M Nath**, AT Swesi, J Masud, S Umapathi, “Investigating Transition Metal Chalcogenides for Efficient Oxygen Evolution Electrocatalysis: The Effect of Covalency and Directionality” *ECS Meeting Abstracts 2017/4/15*, 1405-1405.
- S Umapathi, J Masud, N Ashokan, **M Nath**, “Iron Phosphide Nanoparticles As an Efficient Electrocatalyst for the Oxygen Evolution Reaction in Alkaline Solution” *ECS Meeting Abstracts 2017/4/15*, 1763-1763.
- **M Nath** “New Family of High-Efficiency Oxygen Evolution Electrocatalyst Based on Ni-Fe Mixed Chalcogenides” *PRiME 2016/230th ECS Meeting (October 2-7, 2016)*.
- **M Nath** “Morphology-Controllable Ni₃Se₂ Nanostructures; Synthesis, Characterization and Electrocatalytic Activity Towards Oxygen Evolution Reaction” *ECS Meeting Abstracts 2016/9/1* 3331-3331.
- AT Swesi, J Masud, **M Nath** “New Family of High-Efficiency Oxygen Evolution Electrocatalyst Based on Ni-Fe Mixed Chalcogenides” *ECS Meeting Abstracts 2016/9/1*, 3335-3335.
- **M Nath**, “Transition Metal Chalcogenide Based Electrocatalysts for Facile Water Oxidation/Reduction” *229th ECS Meeting (May 29-June 2, 2016)*.
- **M Nath**, “Nickel Selenide As High-Efficiency Catalyst for Oxygen Evolution Reaction” *228th ECS Meeting (October 11-15, 2015)*.
- J Masud, A Swesi, **M Nath**, “Novel Methanol-Tolerant Metal Selenide Based Chalcogenide Electrocatalysts for Oxygen Reduction in Alkaline Solution” *ECS Meeting Abstracts 2015/7/7*, 16121612.
- WPR Liyanage, JS Wilson, E Kinzel, **M Nath**, “Electrodeposition of Highly Ordered CdTe Nanorod/Nanotube Arrays for Solar Energy Conversion” (*invited presentation*) *ECS Meeting Abstracts, 2258-2258*.
- J Masud, A Swesi, **M Nath**, “Patterned Electrodeposition of Cobalt Selenide Nanostructure Arrays As a Highly Efficient Bifunctional Catalyst for Oxygen Reduction Reaction (ORR) and Oxygen Evolution Reaction (OER)” *ECS Meeting Abstracts 2015/4/29*, 1874-1874.
- **Nath, Manashi**; Masud, Jahangir; Kyritsis, Panayotis, “Molecular Ni-complex containing tetrahedral nickel selenide core as highly efficient electrocatalyst for oxygen evolution reaction in alkaline medium” *Abstracts of Papers, 253rd ACS National Meeting & Exposition, San Francisco, CA, United States, April 2-6, 2017*, INOR-1428.
- De Silva, Umanga; Liyanage, Wipula P.; Masud, Jahangir; **Nath, Manashi**, “Nickel telluride as a bifunctional electrocatalyst for efficient water splitting in alkaline medium” *Abstracts of Papers, 253rd ACS National Meeting & Exposition, San Francisco, CA, United States, April 2-6, 2017 (2017)*, INOR-1044.
- Swesi, Abdurazag T.; Masud, Jahangir; **Nath, Manashi**, “Enhancing electrocatalytic activity of bifunctional Ni₃Se₂ for overall water splitting through etching-induced surface nanostructuring”

Abstracts of Papers, 253rd ACS National Meeting & Exposition, San Francisco, CA, United States, April 2-6, 2017 (2017), CATL-425.

- Liyanage, Wipula P.; **Nath, Manashi**, “Controlled fabrication of nanotube arrays for high efficiency solar energy conversion” *51st Midwest Regional Meeting of the American Chemical Society, Manhattan, KS, United States, October 26-28 (2016)*, MWRM-332.
- Liyanage, Wipula P. R.; **Nath, Manashi**, “Controlled fabrication of copper indium selenide (CIS) nanotube arrays for high efficiency solar cells” *Preprints - American Chemical Society, Division of Energy & Fuels 2016, 61(1)*, 212-213.
- **Nath, Manashi**; Swesi, Abdurazag; Masud, Jahangir, “Transition metal chalcogenides as viable water oxidation/reduction catalysts” *251st ACS National Meeting & Exposition, San Diego, CA, United States, March 13-17, 2016 (2016)*, CATL-408.
- Swesi, Abdurazag; Masud, Jahangir; **Nath, Manashi**, “Electrocatalytic overall water splitting on nickel selenide (Ni₃Se₂)” *251st ACS National Meeting & Exposition, San Diego, CA, United States, March 13-17, 2016 (2016)*, CATL-31.
- Masud, Jahangir; Swesi, Abdurazag; **Nath, Manashi**, “Cobalt-based metal chalcogenide: An efficient catalyst for oxygen and hydrogen catalysis” *251st ACS National Meeting & Exposition, San Diego, CA, United States, March 13-17, 2016 (2016)*, CATL-419.
- Liyanage, Wipula P. R.; **Nath, Manashi**, “CdS-CdTe P-N junction nanotubes for solar cell applications” *Preprints - American Chemical Society, Division of Energy & Fuels 2015, 60(2)*, 491492.
- Masud, Jahangir; Swesi, Abdurazag; Liyanage, Wipula P.; Ashokaan, Nikitaa; **Nath, Manashi**, “Cobalt-based chalcogenides nanostructure arrays as highly efficient bifunctional catalyst for oxygen reduction and evolution reactions” *Preprints - American Chemical Society, Division of Energy & Fuels 2015, 60(2)*, 507.
- Swesi, Abdurazag; Masud, Jahangir; **Nath, Manashi** “Transition metal selenide nanostructures as highly efficient catalysts for oxygen evolution reaction” *250th ACS National Meeting & Exposition, Boston, MA, United States, August 16-20, 2015 (2015)*, INOR-320.
- Masud, Jahangir; Swesi, Abdurazag; Liyanage, Wipula P.; Ashokaan, Nikitaa; **Nath, Manashi**, “Cobalt-based chalcogenides nanostructure arrays as highly efficient bifunctional catalyst for oxygen reduction and evolution reactions” *250th ACS National Meeting & Exposition, Boston, MA, United States, August 16-20, 2015 (2015)*, ENFL-352.
- Liyanage, Wipula P. R.; **Nath, Manashi**, “Highly ordered CdTe nanotube arrays for solar cells through patterned electrodeposition” *Preprints - American Chemical Society, Division of Energy & Fuels 2015, 60(1)*, 585-586.
- Masud, Jahangir; Swesi, Abdurazag; **Nath, Manashi**, “Patterned electrodeposition of cobalt selenide nanostructure arrays as effective ORR catalysts” *249th ACS National Meeting & Exposition, Denver, CO, United States, March 22-26, 2015 (2015)*, INOR-706.

- **Nath, Manashi**; Pariti, Akshay; Ashokan, Nikitaa “Multifunctional magnetic nanomaterials for biomedical applications” *49th Midwest Regional Meeting of the American Chemical Society, Columbia, MO, United States, November 12-15 (2014)*, MWRM-88.
- P. Sood, **M. Nath** “Designing Protocols for Synthesis of Superconducting LiFeAs Nanostructures through Sacrificial Template Method” *Abstracts of Papers, 245th ACS National Meeting & Exposition, New Orleans 2013*, INOR-81.
- S. Mishra, **M. Nath** “Synthesis of Magnetic Multifunctional Au-CoSe Nanoparticles through Chemical Vapor Deposition” *Abstracts of Papers, 245th ACS National Meeting & Exposition, New Orleans 2013*, INOR-453.
- S. Mishra, K. Song, **M. Nath** Enhancement of Superconducting T_c in FeSe Nanostructures through Increased Interfacial Pressure” *Abstracts of Papers, 245th ACS National Meeting & Exposition, New Orleans 2013*, INOR-1293.
- W. Liyanage, **M. Nath** “Low-temperature hydrocarbon-free growth of carbon nanotubes and nanofibers by chemical vapor transport” *48th Midwest Regional Meeting of the American Chemical Society, Springfield, MO, 2013*.
- **M. Nath**, S. Patil “Designed Growth of Photovoltaic Nanowire Arrays on Patterned Substrates” *ACS National Meeting Book of Abstracts, 2011*.
- **M. Nath**, S. Patil “Attempts to Fabricate High-efficiency Chalcogenide Solar Cells through Patterned Growth of Nanowires” *Abstracts of 46 Midwest and 39th Great Lakes Regional Meeting of the American Chemical Society, St. Louis, Amer. Chem. Soc. 2011*, MWGL-126.
- **M. Nath**, S. Patil “Designed Growth of Photovoltaic Nanowire Arrays on Patterned Substrates” *Abstracts of Papers, 242nd ACS National Meeting & Exposition, Denver, 2011*, INOR-268.
- P. Sood, **M. Nath**, E. Hallstrom “Growing Superconducting Ironoxypnictide Nanowires” *Abstracts of Papers, 240th ACS National Meeting & Exposition, Boston, 2010*, INOR-180.

G. STUDENTS ADVISED

Current Graduate Students:

Harish Singh (PhD)

Ibrahim Abdullahi (PhD)

Rajarshi Kar (PhD)

Students graduated (9 PhD, 4 MS):

Apurv Saxena (PhD, 2022)

Siddesh Umapathi (PhD 2020)

Umanga Desilva (PhD, 2020)

Xi Cao (PhD, 2019)

Bahareh Golrokhamin (PhD, 2019)

Wipula Liyanage (PhD, 2018)

Abdurazag Swesi (PhD, 2017)

Prachi Desai (PhD, 2014)

Sukhada Mishra (PhD, 2013)

Malavaan Arivu (MS, Materials Science & Engineering, 2017)

Nikita Ashokaan (MS, Chemical Engineering, 2017)

Akshay Pariti (MS, Chemical Engineering, 2014)

Rasika Nimkar (MS, Chemical Engineering, 2013)

Postdocs Mentored

Dr. Jahangir Masud (2014 – 2019)

Dr. Wipula Liyanage (2019 – 2020)

Undergraduates Researchers:

Kurt Lageman

Megan Percy

Sophia Keene

Justin Chern

Mckenzie Marley-Hines

Emily Johnson

Holly Coleman

Jennifer See

Matthew Perkins

Ryland Forsythe

Eric Hallstrom

Thuydunh Hyunh

Micah Fouke

H. AWARDS & OTHER RECOGNITION

- Missouri S&T Faculty Excellence in Research Award – 2017.
- Department of chemistry excellence in teaching award – Tappmeyer Excellence in Teaching Award, 2016, 2018.
- Certificate of appreciation for highly cited author (RSC) – 2019, 2020.

I. TEACHING ACCOMPLISHMENTS

Teaching Evaluations (SP2015 – Sp2022)

Academic year	Chem 2310 (inorganic I lecture)	Chem 2319 (inorganic lab)	Chem 6330 (Nanomaterials)	Chem 1510 (Qualitative Analysis)
2015	2.92 (SP2015)	3.60 (SP2015)	4.0 (FS2015)	NT [#]
2016	3.27 (SP2016); 3.20 (FS2016)	(not evaluated)	NO ^s	NT
2017	3.15 (FS2017)	3.25 (SP2017)	3.62 (SP2017)	NT
2018	3.10 (FS2018)	2.17 (SP2018)	4.00 (SP2018)	NT
2019	3.00 (FS2019)	2.75 (SP2019)	3.75	NT

2020	3.10 (FS2020)	2.8 (SP2020)	3.8 (SP2020)	NT
2021	3.2 (FS2021)	3.2 (SP2021)	4.00 (SP2021)	3.25 (SP2021)
2022	NO (SP2022)	3.8 (SP2022)	3.86 (SP2022)	NT
Average	3.12	3.08	3.86	

#NT – not taught by MN; ^sNO – Not offered that semester

J. SERVICE & RELATED ACTIVITIES

Committee Service

Department:

Graduate Affairs Committee – Aug 2016 – current (chair)

Graduate recruiting committee – Aug 2014 – July 2016

Search committee for faculty hire in Analytical Division - 2022

Campus:

Search committee for KI Center for Resource & Sustainability founding director – 2021 – current.

KI Research Chancellor's Faculty Advisory Committee – 2020 – current.

Research Proposal Review & Mentoring Panel – 2021 – current.

Faculty External Rewards & Recognition Committee – 2018 – 2021.

Graduate Council – 2019 – current.

Search committee for faculty hire in condensed matter physics – 2020.

Professional & Community Service

(I) Outreach Activities (on campus):

- Co-organized Missouri Inorganic Day, 2013 and 2017 at Rolla. This one-day symposium typically congregates researchers working at the helm of inorganic and materials chemistry from around Missouri and encourages them to share their exciting research through a series of oral and poster presentations.
- Organized two workshops, through ACS south-central Missouri local section celebrating the international year of chemistry. First workshop "Role of Chemistry in Materials Science" was attended by high school teachers and senior students from several local high schools. The second workshop "Energy for a Brighter Tomorrow" highlighting the energy theme for international year of chemistry, was held in Brewer Science, a local semiconductor manufacturing company and featured talks by several Missouri S&T professors and scientists from Brewer Science. The workshop was attended by undergraduate and graduate students from Missouri S&T and Missouri State University, Springfield.
- Hosted several high school students during the summer months through Summer Research Academy (SRA) and also local STEM programs to work in parts of ongoing research projects in the laboratory.

(II) Community Outreach (Field Trips)

- Hosted science demonstration field trips for elementary and middle school students in Bourbon, Fort Wayne, and Kaleidoscope Discovery Center (Rolla) in Missouri. A hands-on chemistry demonstration show, "*Pure Chemistry, Pure Fun*", was conducted with the help of graduate and undergraduate students, where the middle schoolers were also given an opportunity to participate by doing simple experiments under close supervision. These experiments included demonstration of simple concepts of chemistry encompassing transition between states of matter, thermochemistry, catalytic conversions, and energy conversion.

(III) Reviewer & Editorial Activities:

- Dr. Nath is currently serving in the editorial board of *Scientific Reports*, *Advanced Sustainable Systems & Engineering* (Wiley), *Journal of Green Nanotechnology* (Sage publishing, UK), *AIMS Materials Science* (AIMS Press), *J. Scimed. Central: Chemistry* (J. Scimed Central).

- Dr. Nath has served as a panelist for NSF in the Chemistry and MMN divisions, as an online reviewer for DOE science graduate fellowship applications and has also reviewed several proposals for University of Missouri Research Board and ACS PRF. She has also peer reviewed the Pb-test analysis for 3M™ for their Pb check swab kits.
- Dr. Nath has provided scholarly reviews for several journals including *Nature Communications*, *Nature Energy*, *ACS Applied Materials & Interfaces*, *Solar Energy Materials Solar Cell*, *Chemistry of Materials*, *Small*, *Advanced Materials*, *Journal of American Chemical Society*, *ACS Nano*, *Journal of Materials Chemistry A*, *Angewandte Chemie*, *Journal of Materials Research*, *Journal of Solid State Chemistry*, *Journal of Colloid and Interfaces*, *Journal of Physical Chemistry C*, *Thin Solid Films*, *Materials Science & Engineering B*.

(IV) Involvement in Teaching:

Developed a graduate level course on nanomaterials, “Chemistry of Nanomaterials” (Chem 6330) offered in Spring semesters. Dr. Nath also redesigned the Inorganic Laboratory course (Chem 2319) by including several advanced coordination chemistry experiments that aligns well with the inorganic lecture course. Dr. Nath also included experiments from funded research projects (from the Nath lab), that demonstrates application of inorganic chemistry principle to solve real-world problems. Dr. Nath also teaches undergraduate level inorganic chemistry lecture (Chem 2310) along with the lab course (Chem 2319) during fall and spring semesters. Also taught Qualitative Analysis laboratory course (Chem 1510) during Spring 2021.

K. Professional Memberships

- American Chemical Society
- Electrochemical Society
- Materials Research Society.