

Dr. R. MITHUN PRAKASH, M.Sc., M.Phil., Ph.D

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Research Interest

Heterogeneous catalysis, plasmonic materials, interface engineering, 2D materials, renewable energy production, dark photocatalysis

Doctoral thesis

Mechanistic Investigations on the Formation of Unary Metal Oxynitride Systems and their Photocatalytic Applications, Supervisor: Dr. Sakar Mohan, Jain University, India.

Description of my PhD research

- Synthesized unary metal oxynitride systems of **Ti**, **Fe**, **Ni**, and **Cu** for targeted photocatalytic applications.
- Precisely developed materials, emphasizing phase stabilization and band edge potential tunability through adept adjustments of oxide-nitride proportions.
- Employed streamlined strategies, successfully achieving oxide-to-oxynitride and nitride-to-oxynitride transformations under mild conditions.
- Conducted comprehensive studies on photocatalytic applications, including dye degradation, H₂ production, N₂ fixation, heavy metal reduction, pharmaceutical pollutant degradation, and CO₂ conversion.
- Demonstrated proficiency in reactor engineering for photocatalytic applications.

Writing/communications skills

Authored and co-authored **21** academic papers in peer-reviewed journals, including **11** articles, **3** conference proceedings, and **3** book chapters. Additionally, **3** more articles have been submitted for review.

Showcased research contributions by presenting papers at **15** national and international conferences, earning **3** “Best Presentation” awards.

Selected publications (relevant to my thesis)

Mechanistic insights into the phase formation of an atypical iron oxynitride (FexOyNz) system and its multi-functional photocatalytic applications

R. Mithun Prakash, T. A. Quach, U. Bharagav, K. Manjunatha, M. M. Kumari, M. V. Shankar, S. Y. Wu, T. O. Do, M. Sakar, *ACS Sustain. Chem. Eng.*, **2023**, 11, 17272–17284.

Phase engineering of titanium oxynitride system and its solar light-driven photocatalytic dye degradation, H₂ generation, and N₂ fixation properties ([Trending, highly-accessed article](#))

R. Mithun Prakash, T. A. Quach, U. Bharagav, K. Sanath, Y. P. Fu, M. M. Kumari, M. V. Shankar, T. O. Do, M. Sakar, *ACS Sustain. Chem. Eng.*, **2023**, 11, 15192-15206.

Observation of inherited plasmonic properties of TiN in titanium oxynitride (TiO_xN_y) for solar-drive photocatalytic applications

R. Mithun Prakash, T. A. Quach, U. Bharagav, M. M. Kumari, M. V. Shankar, T. O. Do, M. Sakar, *Environ. Res.*, **2023**, 229, 115961.

Key skills

Hands-on experience

Nanomaterials	: sol-gel method, chemical reduction, precipitation method, auto-combustion method, hydrothermal/solvothermal method, and hydro-evaporation method
Crystal growth	: slow evaporation method
Thin films	: spray pyrolysis method
Bio-diesel	: production via esterification and transesterification process
Reactor engineering	: For photocatalytic dye degradation, H_2 production, N_2 fixation, and CO_2 reduction

Data analysis and interpretation

XRD, Rietveld refinement, Raman analysis, XPS, SQUID analysis, BET, UV-Vis-DRS, PL, TRPL, FESEM, TEM, HRTEM, SAED pattern, EDAX, DLS, Zeta Potential, BET & BJH analysis, TG-DTA, CV, EIS, LSV, and Transient photocurrent measurement

Computing

Panalytical X Pert Highscore Plus, Full Prof, Qualx, Match, Vesta, CASA XPS, Image J, Gatan, Mountain SEM analysis, Adobe Photoshop & Dimension, MS Office tools

Research and teaching experience

Duration	Position held	Employer
Jul 2022 – April 2024	SRF	Jain University, India
Feb 2019 - Jun 2022	JRF	Jain University, India
May 2018 - Jan 2019	Project Assistant	Jain University, India
Jul 2017 - Mar 2018	Physics Teacher	Velammal Vidyalaya, India
Jan 2016 - Jun 2017	Lecturer in Physics	Trichy Engineering College, India
Aug 2015 - Dec 2015	Lecturer in Physics	M.A.M. College of Engineering, India

References

1. Dr. Sakar Mohan (PhD supervisor)
Associate Professor and Group Leader,
Centre for Nano and Material Sciences,
Jain University, India, 562112.
2. Dr. Geetha R Balakrishna
Professor and Director,
Centre for Nano and Material Sciences,
Jain University, India, 562112.

(Will coordinate with the above referees for reference upon request)