Dr. Abinash Das
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BIOSKETCH

Dr. Abinash Das and his research group are currently engaged in developing photoactive materials for solar fuel production. Since August 2023, he has been serving as an Assistant Professor in the Department of Physics at PSG Institute of Advanced Studies, Coimbatore. He obtained his master's degree in Physics from the National Institute of Technology (NIT) Silchar, India, where he also pursued and completed his Ph.D. in Physics. Following this, he worked as an Institute Postdoctoral Fellow at the Indian Institute of Technology (IIT) Madras. He later moved to Russia to undertake another postdoctoral assignment at HSE University, Moscow.

Educational Profile

- **Doctor of Philosophy (Ph.D.) in Physics**
  Year of Passing: 2020
  Thesis title: Studies on the Role of Surface Morphology and Type-II Heterojunction on the Improved Photocatalytic Performance of ZnO
  Thesis Supervisor: Dr. Ranjith G Nair, Department of Physics,
  National Institute of Technology Silchar

- **Master of Science (MSc)**
  Department of Physics
  National Institute of Technology Silchar

- **Bachelor of Science (B.Sc.) in Physics**
  Dibrugarh University

Positions Held

Oct 2023 – Present	Assistant Professor Department of Physics PSG Institute of Advanced Studies Peelamedu, Coimbatore
May 2021 – August 2023	Institute Postdoctoral Fellow Mentor: Prof. Basavaraj M. Gurappa and Prof. Aravind Kumar Chandiran Department of Chemical Engineering, Indian Institute of Technology, Madras

Octobar 2022 – August 2023	Postdoctoral Fellow Supervisor: Prof. Andrey Vasenko School of Electronic Engineering HSE University, Moscow, Russia

Research Areas

- Photocatalysic
- Photoelectrocatalysis
- Water Splitting and Hydrogen Production

Awards & Achievements

- Global postdoctoral fellowship from **HSE University, Moscow, Russia**.
- Received **DST** sponsored International Travel Support **(ITS)** for Young Scientists (2018).
- Institute Postdoctoral Fellowship at **IIT Madras** (2021).
- Cleared Graduate Aptitude Test in Engineering (**GATE**) 2016.
- Recipient of **postdoctoral fellowship** from The **Kaunas University of Technology, Lithuania**.

Research Scholars (Ongoing)

Student Name: FREDDY SOLOMON S

Research Topic: 2D material based catalyst for water splitting applications

Funded Projects (Ongoing)

Funding Agency	Amount	Duration	Role
UGC DAE CSR	1,35,000.00 + Access to the experimental facilities at UGC DAE center	**3 years**	**PI**

Invited Talks

- **Abinash Das**, Recent Developments of Metal Oxide Based Photocatalyst in Solar Energy Applications. **NULL-MUSS Complex System Seminar Series held through Hybrid mode**: Laboratory of Complex System modelling and Control, **HSE University Moscow, Russia**. (20th October, 2023).
- **Abinash Das,** Photoelectrochemical (PEC) Water Splitting and Green Energy Production: Recent Advances and Future Prospects. **One day National Workshop on Decarbonization of Transport Sector through Green Hydrogen: Current Status, Challenges and Future Strategies:** Department of Automobile Engineering: **PSG College of Technology, Coimbatore** (1st January, 2025).
- **Abinash Das**, Recent Developments of Photoactive Materials in Water Splitting Applications. **The International Conference on Energy Conversion and Storage – 2025**: **IIT Madras** (27th to 29th January, 2025).

- **Abinash Das,** Fundamentals and Prospects of Photoactive Materials in Photoelectrochemical Applications. **One Day National Workshop on Fueling the Future: Green Hydrogen in Sustainable Transportation. PSG College of Technology, Coimbatore** (04.03.2025).

Journal Publications

- **Abinash Das**,* Shriya Gumber, Nitai C. Maji, Shashi B. Mishrad, Preethi M, Pujita Ningthoukhongjam, Ranjith G. Nair, Abhijith T, Elena A. Kazakova, Andrey S. Vasenko, Madhumitha R, Oleg V. Prezhdo, Electrostatic Self-assembly Driven Heterojunction of Cubic CeO_2/gC_3N_4 Nanosheets for Efficient Photocatalytic Hydrogen Evolution and Photoelectrocatalytic Water Splitting: A Hybrid Experimental and Theoretical Study, ***ACS Applied Materials & Interfaces*** (2025) (Accepted).

- Riu Riu Wary, **Abinash Das***, Emir S Amirov, Dongyu Liu, Shriya Gumber, Elena A Kazakova, Andrey S Vasenko, Oleg V Prezhdo, Highly Oriented Nitrogen-Doped Flower-like ZnO Nanostructures for Boosting Photocatalytic and Photoelectrochemical Performance: A Combined Experimental and DFT Study, ***ACS-The Journal of Physical Chemistry Letters*** 16 (2025) 5180-5187.

- Mikhail R. Samatov, Dongyu Liu, Long Zhao, Elena A. Kazakova, Dmitrii A. Abrameshin, **Abinash Das**, Andrey S. Vasenko, and Oleg V. Prezhdo, Ion Migration at Metal Halide Perovskite Grain Boundaries Elucidated with a Machine Learning Force Field, ***ACS-The Journal of Physical Chemistry Letters*** 15 (2024) 12362−12369.

- **Abinash Das**, Sebin Devasia, Nisha Banerjee, Ranjith G Nair, High aspect ratio ZnO nanorods for improved photoelectrochemical (PEC) water splitting performances and efficient photocatalytic hydrogen evolution: an integrated experimental and DFT studies, ***Applied Surface Science***, 163160 (2025).

- **Abinash Das***, Dongyu Liu, Yifan Wu, Bayan Amer Abzakh, Elena A Kazakova, Andrey S Vasenko, Oleg V Prezhdo, Origin of the Improved Photoelectrochemical and Photocatalytic Activity in a ZnO-TiO2 Nanohybrid Revealed by Experimental and Density Functional Theory Studies, ***ACS-The Journal of Physical Chemistry Letters*** 15 (2024) 7524-7532.

- S.K. Nikhil, Gopika Rajeev Nair, **Abinash Das**, Sebin Devasia, Ranjith G. Nair, An experimental and theoretical validation of dual role of Fe on improving the photocatalytic performance of doped mixed phase titania, ***Advanced Powder Technology,*** 35 (2024) 104683.

- **Abinash Das**, Dongyu Liu, Riu Riu Wary, Andrey S. Vasenko, Oleg V. Prezhdo, Ranjith G. Nair, Enhancement of Photocatalytic and Photoelectrochemical Performance of ZnO by Mg Doping: Experimental and Density Functional Theory Insights, ***ACS-The Journal of Physical Chemistry Letters*** 14 (2023) 4134–4141.

- Trinayana Deka, **Abinash Das**, Sam John, Ranjith G Nair, Exploring the influence of Ag nanocube size on surface plasmon resonance assisted photocatalytic H2-production of optimized Ag loaded TiO2. ***International Journal of Hydrogen Energy*** 72 (2024) 1169-1183.

- **Abinash Das**, Hemant Kumar, Sankar Hariharan, Sumesh P. Thampi, Aravind Kumar Chandiran, Madivala G. Basavaraj, Conducting Gold Nanoparticle Films via Sessile Drop Evaporation, ***ACS-Langmuir*** 40(5) (2024) 2510–2518.

- **Abinash Das**, Dongyu Liu, Riu Riu Wary, Andrey S. Vasenko, Oleg V. Prezhdo, Ranjith G. Nair, Mn-Modified ZnO Nanoflakes for Optimal Photoelectrochemical Performance Under Visible Light: Experimental Design and Theoretical Rationalization, ***ACS-The Journal of Physical Chemistry Letters*** 14 (2023) 9604–9611.

- **Abinash Das**, P Mathan Kumar, Muthuraaman Bhagavathiachari, Ranjith G Nair, Hierarchical ZnO-TiO2 nanoheterojunction: A strategy driven approach to boost the photocatalytic performance through the synergy of improved surface area and interfacial charge transport, ***Applied Surface Science***, 534 (2020) 147321.

- **Abinash Das**, P Malakar, Ranjith G Nair, Engineering of ZnO nanostructures for efficient solar photocatalysis, ***Materials Letters*** 219 (2018) 76-80.
- **Abinash Das**, Nikhil S K, Ranjith G. Nair, Influence of surface morphology on photocatalytic performance of zinc oxide: A review, ***Nano-Structures & Nano-Objects*** 19 (2019) 100353.
- **Abinash Das**, Ranjith G Nair, Effect of aspect ratio on photocatalytic performance of hexagonal ZnO nanorods, ***Journal of Alloys and Compounds*** 817 (2020) 153277.
- **Abinash Das,** Riu Riu Wary, Ranjith G. Nair, Mn-doped ZnO: Role of morphological evolution on enhanced photocatalytic performance, ***Energy Reports*** 6 (2020) 737–741.
- **Abinash Das**, Riu Riu Wary, Ranjith G. Nair, Cu modified ZnO nanoflakes: An efficient visible light driven photocatalyst and a promising photoanode for dye sensitized solar cell (DSSC), ***Solid State Sciences***, 104 (2020) 106290.
- Ranjith G. Nair, **Abinash Das**, Samrat Paul, Bijumani Rajbongshi, S. K. Samdarshi, MWCNT decorated V-doped titania: An efficient visible active photocatalyst, ***Journal of Alloys and Compounds*** 695 (2017) 3511-3516.
- **Abinash Das**, Moumita Patra, Mathan Kumar P, Muthuraaman Bhagavathiachari, Ranjith G. Nair, Defect induced visible light driven photocatalytic and photoelectrochemical studies of well-crafted ZnO-CeO2 nanoheterojunction, ***Journal of Alloys and Compounds***, 858 (2020) 157730.
- **Abinash Das**, Moumita Patra, Mathan Kumar P, Muthuraaman Bhagavathiachari, Ranjith G. Nair, Role of type II heterojunction in ZnO-In2O3 nanodiscs for enhanced visible-light photocatalysis through the synergy of effective charge carrier separation and charge transport, ***Materials Chemistry and Physics*** 263 (2021) 124431.
- **Abinash Das**, P Mathan Kumar, Muthuraaman Bhagavathiachari, Ranjith G Nair, Shape selective flower-like ZnO nanostructures prepared via structure-directing reagent free methods for efficient photocatalytic application. ***Materials Science and Engineering B*** 269 (2021) 115149.
- Nikhil S K, **Abinash Das**, Mathan Kumar P, Muthuraaman Bhagavathiachari, Ranjith G. Nair, Effect of aspect ratio of c-axis oriented ZnO nanorods on photoelectrochemical performance and photoconversion efficiency, ***Optical Materials*** 121 (2021) 111551.
- **Abinash Das**, Trinayana Deka, P. Mathan Kumar, Muthuraaman Bhagavathiachari, Ranjith G. Nair, Ag-modified ZnO nanorods and its dual application in visible lightdriven photoelectrochemical water oxidation and photocatalytic dye degradation: A correlation between optical and electrochemical properties, ***Advanced Powder Technology*** 33 (2022) 103434.
- **Abinash Das,** P. Ningthoukhongjam, Ranjith G. Nair, A study on the crucial reaction parameters involved in photocatalytic and sonophotocatalytic removal of organic pollutants, ***Water, Air, & Soil Pollution***, 232: 282 (2022) 1-19.
- **Abinash Das**, Ranjith G. Nair, Fabrication of In2O3 functionalized ZnO based nanoheterojunction photoanode for improved DSSC performance through effective interfacial charge carrier separation, ***Optical Materials*** 122 (2021) 111784

Total Number of Conference Papers/Proceedings: 05