

## Dr. Arijit Jana

Postdoctoral researcher

Under Prof. Stefanie Dehenen

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Date of birth: 28/05/1995



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### EDUCATION

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#### Doctor of Philosophy (PhD)

Degree awarded in April 2023

Department of Chemistry

Indian Institute of Technology, Madras, India

#### Master of Science

Degree awarded in May 2017

Grade (CGPA) 8.55

Major: Chemistry

Department of Chemistry

Indian Institute of Technology, Madras, India

#### Bachelor of Science

Degree awarded in May 2015

Percentage 73%

Major: Chemistry

Ramakrishna Mission Vidyamandira, Belur Math

University of Calcutta, India.

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### ACADEMIC ACHIEVEMENTS

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- Institute Research (IR) Award in the field of Chemistry for the recognition of excellent research work, awarded by IIT Madras.
- Oral presentation award at Molecular Materials and Functions conference, jointly organized by IIT Madras and INST Mohali.
- Best poster presentation award at 1<sup>st</sup> International Conference on Convergence of Interdisciplinary Science, organized by Science Dialectica.
- Best poster presentation award at NANOicon-2022 CUSAT golden jubilee international conference, organized by IUCND, Cochin University of Science and Technology.
- Best poster award at Leaders in the field symposium Chemical Science 2021, organized by JNCASR, Bangalore.
- Awarded Erasmus+ Global Mobility scholarship for conducting scientific research at Aalto University, Finland. (Advisor: Prof. Robin H. A. Ras)
- Qualified for the Junior Research Fellowship (CSIR-JRF) (AIR 67) for PhD admission, in June 2017.
- Awarded Prof Ramamurthy Endowment prize for Best MSc Dissertation from Indian Institute of Technology Madras.

- Qualified GATE examination in chemistry in 2017 (AIR 228, among 10000 students).
- Awarded INSPIRE scholarship from 2012 to 2017 (top 1% student in Higher Secondary).

## RESEARCH CAREERS

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**Ph.D. Position** (June 2017 –July 2023)

**Advisor:** Prof. Thalappil Pradeep

Indian Institute of Technology Madras, Chennai, India

**Thesis title:** Atomically Precise Clusters of Silver and Copper: Diversity in Structure and Properties

**M.Sc. project** (May 2016 - May 2017)

**Advisor:** Prof. Sundargopal Ghosh

Indian Institute of Technology Madras, Chennai, India

**Thesis title:** Triaryl Borane Appended Phenothiazine: Luminogens Having Triboluminescence, Mechanochromism and Intramolecular Charge Transfer Property.

## PUBLICATIONS

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1. Biswajit Mondal,\* **Arijit Jana**,\* Jayoti Roy,\* Astrid Campos-Mata, Akhil S Nair, Soumyabrata Roy, Ananthu Mahendranath, Biswarup Pathak, Pulickel M. Ajayan, and Thalappil Pradeep. *Co-crystallized Ternary Molybdenum Oxo-sulfide Clusters for Efficient Electrochemical Water Splitting*. **ACS Materials Lett.**, 2023, 5, 3306–3315. (\* equal contribution)
2. **Arijit Jana**, Wakeel Ahmed Dar, Sourav Kanti Jana, Ajay Kumar Poonia, Vivek Yadav, Jayoti Roy, Sourov Chandra, Kumaran Nair Valsala Devi Adarsh, Robin H. A. Ras, Thalappil Pradeep. *Photoconversion of Ag<sub>31</sub> to Ag<sub>42</sub> Initiated by Solvated Electrons*. **Chem. Mater.**, 2023, 35, 17, 7020–7031.
3. **Arijit Jana**, B. K. Spoorthi, Akhil S. Nair, Ankit Nagar, Biswarup Pathak, Tomas Base, and Thalappil Pradeep. *A luminescent Cu<sub>4</sub> cluster film grown by electrospray deposition: a nitroaromatic vapour sensor*. **Nanoscale**, 2023, 15, 8141-8147.
4. **Arijit Jana**, Amoghavarsha Ramachandra Kini, and Thalappil Pradeep. *Atomically Precise Clusters: Chemical Evolution of Molecular Matter at the Nanoscale*. **AsiaChem**, 2023, 56-65.
5. **Arijit Jana**, Madhuri Jash, Wakeel Ahmed Dar, Jayoti Roy, Papri Chakraborty, Ganesan Paramasivam, Sergei Lebedkin, Kaplan Kirakci, Sujana Manna, Sudhadevi Antharjanam, Jan Machacek, Monika Kucerakova, Sundargopal Ghosh, Kamil Lang, Manfred M Kappes, Tomas Base, and Thalappil Pradeep. *Carborane-thiol protected copper*

- nanoclusters: stimuli-responsive materials with tunable phosphorescence*. **Chem. Sci.**, 2023, 14, 1613-1626.
6. Anagha Josh, **Arijit Jana**, Tanvi Gupte, Akhil S Nair, Keerthana Unni, Ankit Nagar, Amoghavarsha R Kini, BK Spoorthi, Sourav Kanti Jana, Biswarup Pathak, and Thalappil Pradeep. *Vertically Aligned Nanoplates of Atomically Precise Co<sub>6</sub>S<sub>8</sub> Cluster for Practical Arsenic Sensing*. **ACS Materials Lett.** 2023, 5, 3, 893–899.
  7. Sourov Chandra, Alice Sciortino, Susobhan Das, Faisal Ahmed, **Arijit Jana**, Jayoti Roy, Diao Li, Ville Liljeström, Hua Jiang, Leena-Sisko Johansson, Xi Chen, Marco Cannas, Thalappil Pradeep, Bo Peng, Robin HA Ras, Zhipei Sun, Olli Ikkala, and Fabrizio Messina. *Gold Au(I)<sub>6</sub> Clusters with Ligand-Derived Atomic Steric Locking: Multifunctional Optoelectrical Properties and Quantum Coherence*. **Adv. Optical Mater.** 2023, 2202649, 1-8.
  8. Madhuri Jash, **Arijit Jana**, Ajay K Poonia, Esma Khatun, Papri Chakraborty, Ankit Nagar, Tripti Ahuja, KV Adarsh, and Thalappil Pradeep. *Phosphine-Protected Atomically Precise Silver–Gold Alloy Nanoclusters and Their Luminescent Superstructures*. **Chem. Mater.** 2023, 35, 1, 313–326.
  9. **Arijit Jana**, Parvathy M. Unnikrishnan, Ajay K. Poonia, Jayoti Roy, Madhuri Jash, Ganesan Paramasivam, Jan Machacek, K N V D Adarsh, Tomas Base, and Thalappil Pradeep. *Carboranethiol-protected Propeller-Shaped Photoresponsive Silver Nanomolecule*. **Inorg. Chem.**, 2022, 61, 23, 8593-8603. (ACS Editors' Choice)
  10. Wakeel Ahmed Dar, **Arijit Jana**, Korath Shivan Sugi, Ganesan Paramasivam, Mohammad Bodiuzzaman, Esma Khatun, Anirban Som, Ananthu Mahendranath, Amrita Chakraborty, and Thalappil Pradeep. *Molecular Engineering of Atomically Precise Silver Clusters into 2D and 3D Framework Solids*. **Chem. Mater.**, 2022, 34, 10, 4703-4711.
  11. **Arijit Jana**, Madhuri Jash, Ajay K. Poonia, Ganesan Paramasivam, Md. Rabiul Islam, Papri Chakraborty, Sudhadevi Antarjanam, Jan Machacek, Sundargopal Ghosh, Kumaran Nair Valsala Devi Adarsh, Tomas Base, and Thalappil Pradeep. *Light-Activated Intercluster Conversion of an Atomically Silver Nanocluster*. **ACS Nano**, 2021, 15, 10, 15781-15793.
  12. Sritama Mukherjee, Manav Shah, Kamallesh Chaudhari, **Arijit Jana**, Chennu Sudhakar, Pillalamarri Srikrishnarka, Md Rabiul Islam, Ligy Philip, Thalappil Pradeep. *Smartphone-based fluoride-specific sensor for rapid and affordable colorimetric detection and precise quantification at sub-ppm levels for field applications*. **ACS Omega**, 2020, 5, 39, 25253–25263. (ACS AuthorChoice)

13. **Arijit Jana**, Papri Chakraborty, Wakeel Ahmed Dar, Sourov Chandra, Esma Khatun, MP Kannan, Robin HA Ras, Thalappil Pradeep. *Dual emitting Ag<sub>35</sub> nanocluster protected by 2-pyrene imine thiol*. **Chem. Commun.**, 2020, 56, 12550-12553.
14. **Arijit Jana**, Sourav Kanti Jana, Depanjan Sarkar, Tripti Ahuja, Pallab Basuri, Biswajit Mondal, Sandeep Bose, Jyotirmoy Ghosh, Thalappil Pradeep. *Electrospray Deposition-Induced Ambient Phase Transition in Copper Sulphide Nanostructures*. **J. Mater. Chem. A**, 2019, 7, 6387-6394. (JMCA Hot Paper)
15. C. Arivazhagan, Sitakanta Satapathy, **Arijit Jana**, Partha Malakar, Edamana Prasad and Sundargopal Ghosh. *Phenothiazine Based Oligo(p-phenylenevinylene)s: Substituents Affected Self-Assembly, Optical Properties and Morphology Induced Transport*. **Chem. Eur. J**, 2018, 24, 13213-13222.
16. C. Arivazhagan, A. Maity, K. Bakthavachalam, **Arijit. Jana**, Suraj Kumar Panigrahi, E. Suresh, Amitava Das and Sundargopal Ghosh. *Phenothiazinyl Boranes: A New Class of AIE Luminogens with Mega Stokes Shift, Mechanochromism and Mechanoluminescence*. **Chem. Eur. J**, 2017, 23, 7046-7051.

#### BOOK CHAPTERS

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1. **Arijit Jana**, and Thalappil Pradeep. *Nanocluster Assembled Solids*. 2023, Chapter 3, 49-82. Book title: Atomically Precise Metal Nanoclusters, ELSVIER (DOI: <https://doi.org/10.1016/C2020-0-03265-2>).

#### PATENTS

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1. Prof. T. Pradeep, **Arijit Jana**, Sourav Kanti Jana, and Depanjan Sarkar. *Method for generating different phases of copper sulphide nanostructures using electrospray deposition (ESD) under ambient conditions*. ID: 201941032379. (Indian patent)
2. Prof. T. Pradeep, A. Sreekumaran Nair, **Arijit Jana** and C. M. Cherian. *Synthesis of copper sulfide nanostructures in brass coated steel cords used in radial tires under ambient conditions*. Joint invention between IITM and MRF Tires. ID: 202141047183. (Indian Patent)
3. Prof. T. Pradeep, Anagha Jose, **Arijit Jana**, Tanvi Gupte, Keerthana Unni, Ankit Nagar, Amoghavarsha R. Kini, B.K. Spoorthi. *Vertically aligned nanoplates of atomically precise Co<sub>6</sub>S<sub>8</sub> cluster for practical arsenic sensing*. ID: 202241076581. (PCT application, PCT/IN2023/050856)

## RESEARCH INTERESTS

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- Synthesis, characterization of Ag and Cu nanoclusters protected by carborane thiols and triazine-dithiol ligands.
- Crystallization of large macromolecular clusters.
- Photochemical transformations of metal clusters.
- Small molecule adsorption and catalysis on the surface of the metal clusters.
- Nanoscale fabrication of various nanostructured materials using electrospray deposition (ESD) technique at ambient condition.
- Luminescence and electrochemical sensing study using cluster assembled solids.
- Photo electrochemical conductivity measurements for nanoscale materials.
- Organic synthesis of phenothiazine borane, polyvinylpyrrolidone (PVP) and different imine-thiol derivatives. (MSc research work)

## TECHNICAL SKILLS

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- Co-supervising one summer student and five PhD research scholars during my PhD.
- Supervised Bachelor students in two physical chemistry laboratory course.
- Teaching Assistant for B. Tech. students for basic chemistry course.
- **IT skills:** Windows, Microsoft office, Origin lab, Mendeley, Mercury, Vesta, MestReNova, X Pert High Score PXRD software, Adobe Illustrator (started learning).
- **Project proposal writing:** *Carborane-protected metal nanoclusters: A new family of materials with atomic precision.* A Bilateral joint project proposal submitted to DST, Govt. Of India and MEYS, Czech Republic. Grant no: DST/INT/Czech/P-16/2020 and LTAIN19152. (On behalf of Prof. Thalappil Pradeep and Dr. Tomas Base)
- **Peer reviewed articles** in Journal of the American Chemical Society (ACS), Inorganic Chemistry (ACS), ACS Nano (ACS), Chem. Soc. Rev. (RSc), Nano select (Wiley) (On behalf of Prof. Thalappil Pradeep)

### Instrumental experiences:

- Perkin Elmer Lambda 25 UV-visible spectrometer.
- Nanolog Jobin Yvon Fluorescence spectrometer.
- Perkin Elmer Spectrum One Fourier Transform- Infrared spectrometer.
- Optical microscope (Keyence and Leica microscope).

- Balzers ThermoStar Residual Gas Analyzer for the analysis and detection of gases.
- Mayura Gas chromatography (GC) for analyzing liquid and gaseous samples.
- Nano-electrospray deposition setup.
- NMR instrument (Bruker 500 MHz).

## CONFERENCE PRESENTATIONS

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- **Feb. 2023:** *Nanomolecules with atomic precision*. 2nd International conference on convergence of interdisciplinary science 2022, organized by Science Dielectica. (talk)
- **Dec. 2022:** *Carborane-thiol Protected Tetranuclear Copper Nanoclusters*. Molecular Materials and Functions conference at IIT Madras. (talk)
- **Dec. 2021:** *Carborane Thiol Protected Hexagonal Propeller-shaped Silver Nanomolecule with Bidirectional Rotational Orientation*. ICANN 2021 conference organized by IIT Guwahati. (talk)
- **Sept. 2021:** *Light-triggered Interconversion of Carborane thiol-Protected Silver Nanoclusters*. Indo-Japan virtual workshop on cluster science by an interdisciplinary approach, organized by IIT Madras and The University of Tokyo. (talk)
- **Feb. 2022:** *Carborane-thiol Protected Cu<sub>4</sub> Nanoclusters: Tunable Phosphorescence and X-ray Radioluminescence Materials*. 28<sup>th</sup> CRSI NSC-28 conference, organized by IIT Guwahati. (poster)
- **Jan. 2022:** *Intercluster Conversion of an Atomically Precise Silver Nanocluster*. NANOicon 2022 conference, organized by IUCND, Cochin University of Science and Technology. (poster)
- **Dec. 2021:** *A Hexagonal Propeller-Shaped Silver Nanomolecule*. Leaders in the field symposium, Chem. Sci. 2021, organized by JNCASR Bangalore. (poster)
- **Sept. 2018:** *Ambient Phase Transition from Semiconducting Cu<sub>2</sub>S Nanopyramids to Metallic Cu<sub>1.8</sub>S Platelets by Electrospray Deposition*. CiHS, Department of Chemistry, IIT Madras. (poster)
- **Dec. 2017:** *Luminous Organo-boranes: A New Class of Materials Towards Flexible Electronics*. Project defense at IIT Madras, Exploratory Research Project (ERP) grant CHY/16-17/845/RFER/SGHO. (Poster presented on behalf of Prof. Sundargopal Ghosh)

## REFERENCES

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**1. Prof. Thalappil Pradeep**

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Indian Institute of Technology Madras  
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**3. Prof. Robin H.A. Ras**

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**4. Dr. Tomas Base**

Institute of Inorganic Chemistry  
The Czech Academy of Sciences  
250 68 Husinec-Rez, Czech Republic  
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**5. Prof. K.V. Adarsh**

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IISER Bhopal  
Bhopal 462066, India  
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