Research Profile

Dr. RATAN DAS
Assistant Professor (Stage III)
(April, 2012 - till date)
Department of Physics
Tripura University, Tripura
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Date of joining at Tripura University: 09-04-2012

Academic Qualification: Ph.D. in Physics, M-Phil
(NET, SLET, and GATE qualified in 2010)

Total no. of research publication- 68, Google scholar citation- 3196, h-index-25, i10 index - 41

I have been enlisted in the "World Top 2% influential scientists" for the year 2023 and 2024 as published by Stanford University, USA and Elsevier, Netherlands.

https://topresearcherslist.com/Home/Profile/944263

My one research paper on X-ray diffraction analysis published in the Journal "Materials Chemistry and Physics" in the year 2020 has got more than 1050 citations.

Debojyoti Nath, Fouran Singh, Ratan Das, X-ray diffraction analysis by Williamson-Hall, Halder-Wagner and size-strain plot methods of CdSe nanoparticles- a comparative study, **Materials Chemistry and Physics, 239 (2020) 122021.**
https://doi.org/10.1016/j.matchemphys.2019.122021

Subjects (Papers) teaching at the PG level:

(i) General Quantum mechanics
(ii) Nuclear Physics and Particle Physics,
(iii) Advance Quantum Mechanics.
(iv) Astrophysics and Astronomy
(v) Nanoscience and Nanotechnology

Academic links: VIDWAN | Google Scholar | IRINS |

Research Interest:

(Total Citation- 3063, h-index-25, i10 index - 40)

Research interest lies in the field of Nanoscience and Nanotechnology.

(i) Synthesis of different types of nanoparticles including noble metal nanoparticles, Semiconductor nanoparticles, and magnetic nanoparticles.

(ii) Special interest in the X-ray diffraction analysis for microstructural study and Raman spectral analysis.

(iii) Band gap engineering, phase transition and defects creation by SHI irradiation.

(iv) Working actively in the applications of nanomaterials as sensors and removal agents of toxic chemicals like pesticides, dyes, fluorides

(v) Application nanoLED, solar cells, soft magnetic materials

(vi) Biolomedical application of nanomaterials like antibacterial agents, nano biofertilizers, cytotoxic study on cancer cell, antifungal activity

(vii) Sensing of toxic chemicals like pesticides, dyes, fluoride through colorimetric, spectroscopic methods and FRET based systems. Removal of such toxic chemicals for water purification purposes.

Projects completed and Ongoing: (Total grants- 90.72 lacs)

Sl. No.	Title of the project	Funding agency	Total grant (Rs)	Status
1	Thermal analysis of a few synthesized magnetic and non-magnetic metal doped Spinel ferrite Nano crystals by TGA/DTA and their subsequent structural, optical and electrical study	SERB-DST, New Delhi	**54.61 Lakhs**	Completed (2018-2021)
2	Study of the energy transfer between fluorescent proteins and synthesized a few noble metal nanoparticles of different size and shape	SERB-DST, New Delhi	**28.73 Lakhs**	Completed (2018-2021)

3	To study the correlation between optical and elastic properties of swift heavy ion irradiated samples of chemically synthesized a few Gr. II-VI semiconductor nanocrystals	IUAC, New Delhi	**Rs. 603897**	Completed (2018-2022)
4	Study of the magnetic structure in a few synthesized metal doped spinel ferrite nanocrystals using neutron scattering method	UGC-DAE Consortium Mumbai	**1.35 Lakhs**	Completed (2018-2021)
5	Determination of SHI irradiation induced dislocation density of rare earth metal doped dilute magnetic semiconductors from XRD peak profile analysis and its influence on optical electrical and magnetic properties.	IUAC, New Delhi	**6.75 lakhs**	Ongoing (2023-2026)

Research Supervision: (PhD): PhD awarded - 6, Ph. D ongoing -2

Sl. No.	Name of the Candidate	Title of the Thesis	Status
1	**Dr. Sumit Sarkar**	**Synthesis of anisotropic silver nanocrystals for the study of their elastic and optical properties with suitable applications**	**Awarded in 2018**
2	**Dr. Pijush Ch. Dey**	**Synthesis of a few pure and doped group II-VI semiconductor nanocrystals by chemical route for the study of their optical and elastic properties and their applications**	**Awarded in 2021**
3	**Dr. Babli Debnath**	**Sensing, degradation, removal of toxic chemicals from water, using synthesized silver nanoparticles, along with a few biological applications.**	**Submission date: 22/07/2022 Registration date: 18/10/2017 Award date: 24/11/2022**
4	**Dr. Simi Debnath**	**Synthesis of a few metal doped spinel ferrite nanocrystals for the study of their structural, optical and magnetic properties along with suitable**	**Submission date:14/08/2023 Registration date: 18/10/2017**

		applications	**Award date: 21/12/2023**
5	**Dr. Debojyoti Nath**	**Swift heavy ion (SHI) irradiation on CdSe & CdS nanocrystals for the study of phase transformation and microstructural modifications, along with their optical properties.**	**Submission date: 04/08/2022 Registration date: 26/02/2020 Award date: 11/01/2023**
6	**Dr. Sanghita Basak**	**Studies on structural, electrical & optical properties of some group II-VI semiconductor nanocrystals along with analyzing the effect of swift heavy ion irradiation.**	**Submission date: 24/09/2024 Registration date: 29/07/2021 Award date: 28/02/2025**
7	**Ms. Suari Debbarma**	**Green synthesis of silver nanoparticles for sensing and removal of toxic elements from water along with important biomedical applications**	**Registration date**
8	**Chingskan Debbarma**	**Rare earth metal doped Group II -VI semiconductor nanocrystals and SHI Irradiation effect**	**Course work ongoing**

Research Collaborator:

- ➔ Dr. Fouran Singh, Inter-University Accelerator Centre (IUAC), New Delhi, India.
- ➔ Dr. S M Yusuf, Solid state Division, BARC, Mumbai
- ➔ Dr. V. K Aswal, Solid state Division, BARC, Mumbai
- ➔ Prof. Siddhartha Sankar Nath, Assam University, India.

List of Publication: (Total Citation- 3063 , h-index-25, i10- 41)

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e- ISSN: 2278-067X, p-ISSN: 2278-800X, www.ijerd.com

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[63] Simi Debnath and **Ratan Das,** Strong adsorption of CV dye by Ni ferrite nanoparticles for waste water purification: Fits well the pseudo second order kinetic and Freundlich isotherm model, **Ceramics International,** 49, 10, (May 2023), 16199-16215 **https://doi.org/10.1016/j.ceramint.2023.01.218, (I.F.-5.532) ISSN 1873-3956**
Scopus , Web of Science

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through DFT+ U and TS model, **Materials Science in Semiconductor Processing,** 138 (Feb. 2022) 106278. **(I.F.- 4.644)** **https://doi.org/10.1016/j.mssp.2021.106278, ISSN: 1369-8001** Scopus , Web of Science

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[6] **Ratan Das**, Sneha Gang, Siddartha S. Nath, and Ramendu Bhattacharjee, Linoleic Acid Capped Copper Nanoparticles for Antibacterial Activity, **J. Bionanosci.,** 2010, 4, 82-86. ISSN: 1557-7910 **(I.F.- 0.966)** **https://doi.org/10.1166/jbns.2010.1035**

[5] **Ratan Das**, S. S. Nath, G. Gope, D. Chakder, and R. Bhattacharjee, Synthesis of Silver Nanoparticles and Their Optical Properties, **Journal of Experimental Nanoscience** , 2010, 5(4), 357-362, ISSN: 1745-8099. **(I.F.- 3.075) https://doi.org/10.1080/17458080903583915, Scopus**

[4] S. C. Dey, **Ratan Das**, G. Gope, S. S. Nath, and R. Bhattacharjee, UV/vis spectroscopy and impedance analysis of CdSe Quantum Dots, Assam University Journal of Science & Technology, 2010 6(II), 1-5, ISSN 0975-2773.

[3] S. C. Dey, **Ratan Das**, S. S. Nath, and R. Bhattacharjee, Photoluminescence of CdSe Quantum dots suspended in liquid paraffin, **OPTOELECTRONICS AND ADVANCED MATERIALS**, 2010, 4(11), 1721 – 1723. **(I.F.- 0.5) No Doi no.**

[2] **Ratan Das**, S. S. Nath, and R. Bhattacharjee, Characterization of Linoleic Acid Capped Copper Nanoparticles (Chapter Title), **Synthesis and Characterization of Nanostructured Materials (Book title), MacMilan Publishers,** 2010, 299-304, ISBN 10:0230-33193-9.

[1] S. S. Nath, D. Chakdar, G. Gope, **Ratan Das** and D. K. Avasthi, Novel Effect of 100 MeV Ni^{+7} ion on silica coated ZnS quantum dots, IUAC Annual Report, pp 148, 2008.

Ratan Das

Seminars/ Conferences attended:

Invited talk - 17, Oral/poster presentation- 29
(International- 11, National- 32, State-)

47. Delivered an **invited talk** as a Resource person in the National Seminar on Future Directions in Multidisciplinary Innovations for Viksit Bharat on the Topic " **SHI irradiation effect on a few semiconductor nanocrystals and applications**" organized by the Internal Quality Assurance Cell (IQAC) and Science Departments, Government Degree College, Dharmanagar, North Tripura during 3-4 March, 2025

46. Delivered an **invited talk** as a Resource person on Emerging areas of Science and Technology on the Topic " **Nanoparticles are beautiful and widely applicable**" organized by the Department of Basic Science and Humanities (BHS) and Institution Innovation Council (IIC) of Techno College of Engineering , Agartala on **12th April, 2024.**

45. Delivered an **invited talk** as a Resource Person for the Topical Research School (TRS) on Recent Trends of Research in Theoretical and Experimental Physics jointly organised by the Department of Physics, Gurucharan College Silchar and S.N.Bose National Centre for Basic Sciences Kolkata from 11 th to 13th March, 2024.
Title of the talk: Small is beautiful and widely applicable

44. Delivered an **invited talk on** "Nanoscience and Nanotechnology: Applications and Future" in the "Webinar of application of Nanotechnology in the research field of chemical and Physical Sciences", organised by the PDUAM, Eraligool, Karimganj, Assam held on 14/05/2023.

43. Delivered an **invited talk on** "Nanoscience and Nanotechnology: A platform for executing expected applications specially in the field of Sustainable energy" in the celebration of National Science Day-2022 on the theme "Integrated Approach in S & T for Sustainable Future" held on 20th July 2022 at Bir Bikram Memorial College. Tripura, Agartala.

42. Delivered an **invited talk on** "Nanoscience and Nanotechnology: A platform for executing expected applications" in the programme of "National Science Day"organised by Department of Physics, Iswarchandra Vidyasagar College, Belonia, Tripura, held on 4th April, 2022.

41. Delivered an **invited talk on** "Nanoscience and Nanotechnology: a simple discussion about past, present and future" in the **One day seminar on Recent Advances in Physical sciences** organised by Department of Chemistry and Department of Physics, Netaji Subhash Mahavidyalaya, Udaipur, Gomati, Tripura. on December 30, 2021.

40. Delivered an **invited talk** on "Influence of SHI induced microstructural modifications on the optoelectronics properties of CdS and CdSe nanocrystals: A suitable material for Solar cell and power generation application" in the ATAL FDP on Progress in Novel Two dimensional Materials organised by Department of Physics, Tripura University held from 04-08 October, 2021.

39. **Oral presentation** on "Modifications of the band gap of CdSe nanocrystals by SHI irradiation; A supported theoretical DFT based analysis." in the International Virtual Conference on Materials Research (IVCMR-21) organised by the Department of Physics, Easwari Engineering College, Ramapuram, Chennai held during August 26-27, 2021.

38. Delivered an **invited talk** on "Structural modification of a few semiconductor nanocrystals through swift heavy ions (SHI) irradiation" in the ATAL FDP on Novel materials organised by Department of Physics, Tripura University held online from 24-28 August, 2021.

37. **Oral presentation** entitled "Band Gap Modification of Cadmium Selenide Nanocrystals using Swift Heavy Ions: Supported Theoretical Analysis through DFT analysis" in the International Conference on Ion Beams in Materials Engineering and Characterization (IBMEC-2020) organised by IUAC, New Delhi 8-11 Dec, 2020.

36. Delivered an **invited talk** entitled "Sensing of different Toxic Chemicals in Water using nanomaterials" in the AICTE (ATAL) FDP online on Sensor Technology organised by Department of Physics, Tripura University AICTE from 21-25 sept., 2020.

35. Delivered an **invited talk** on "X-ray Diffraction analysis of nanomaterials and its application" in the National Webinar on Recent Advances in Physical Research organised by Govt. Degree College, Dharmanagar, Tripura 12th August, 2020.

34. Delivered an **invited talk** on "Characterization of Nanomaterials by X-ray diffraction analysis" in the Two days National Webinar on Recent Development in the Characterization of Nanomaterials organised by Department of Chemistry, G C College, Silchar, Assam 10th September, 2020.

33. Delivered an **invited talk** "Removal of pesticides from drinking water using noble metal nanoparticles" in the Indo-French Workshop on Water Treatment and Management organised by UPES, Dehradun 28th -29th March, 2018.

32. **Oral presentation** on "Shape effect on the Elastic and optical Properties of Silver Nanocrystals " in the UGC and INSA sponsored National Seminar on Frontiers of Research in Physical Sciences organised by Department of Physics, Karimganj College, Assam 19-21 January, 2018.

31. Presented a paper entitled "On the Sensing of a few pesticides using PVP capped Silver Nanocrystals " in the Bose Tagore National Advanced Workshop on Recent Advances in Condensed Matter Physics: Theory and Experiment organised Department of Physics, Visva-Bharati, Santiniketan, 3-4 August, 2018.

30. **Oral presentation** on "**PVP capped silver nanocrystals as sensors of pesticides** " in the UGC sponsored National Seminar on Recent Trends in Basic Science Research (RTBSR-2017) organised by **Dept. of Physics and Chemistry Srikrishna Sarada College, Hailakandi, Assam 21 Sep. to 23rd Sep., 2017.**

29. Presented a paper entitled "Elastic and Optical properties of Silver Nanocrystals" in the International Conference on Ion Beams in Materials Engineering and Characterization (IBMEC-2016) organised by IUAC, New Delhi 28th Sep. to 1st October, 2016.

28. Delivered an **invited talk** "Nanotechnology" in the PHOENICS-2016, organised by the Department of Electrical Engineering, Tripura University and Institute of Radio Physics and Electronics, University of Calcutta during 29 March - to 4th March, 2016.

27. Presented a poster entitled "Shape effect of the photoluminescence spectra of chemically synthesised anisotropic silver Nanocrystals" in the ICAAN-2015, organised by Center for nanotechnology, IIT Guwahati during 08-11 Dec., 2015.

26. Delivered an **invited talk** "**Nanoparticles and Applications**" in the DBT sponsored star college workshop on Physics organised by the Department of Physics, S. S. College, Hailakandi, Assam on **14th March, 2015.**

25. Presented a poster entitled "Elastic Properties of Anisotropic silver nanocrystals" in the Winterschool-2014 on Frontier of Material Science, organised by lInternational Center for material science, JNCSAR, Bengaluru in association with Cambridge university during 01-5th Dec, 2014.

24. Presented a poster entitled "X-ray diffraction analysis of anisotropic silver nanocrystals" in the Third International symposium on clusters, cluster assemblies and nanoscale materials (ISCANM-III) held at Harish Chandra Research Institute, Allahabad during March 11-14, 2014.

23. **Oral presentation** on "Mechanical properties of anisotropic silver nanocrystals" in the National Seminar on Frontiers of Research in Physical Sciences organised by Department of Physics, Karimganj College, Karimganj, Assam during 19-21 Sep, 2014.

22. Delivered an **invited talk** "Nanoscience and Nanotechnology" in the DBT sponsored star college workshop on Physics organised by the Department of Physics, Karimganj college, Karimganj, Assam, during 28 Feb. to 2nd March, 2013.

21. Presented a poster entitled "Two peak luminescence from linoleic acid capped gold nanoparticles" in the ICMS-2013 organised by Department of Physics, Tripura University Tripura during 21-23 Feb, 2013.

20. **Oral presentation** on "Synthesis of a few noble metal nanocrystals and their antibacterial activity" in the National Seminar on Green Chemistry and Nanoscience: Theory and application organised by Department of Chemistry, MBB college, Agartala, Tripura during 20-21 July, 2012.

19. Participated in Workshop on "Scanning Electron Microscopy", held at SAIF, NEHU, Shillong, during 27-29 March, 2012.

18. **Oral presentation** on " Gravitational instability of a weakly ionised dusty plasma" in the National seminar on Dusts in Astrophysics 2012, held at Department of Physics, Assam University, Silchar, during 31 Jan.-02 Feb.,2012.

17. **Oral presentation** on "Preparation and Characterization of Copper and Palladium Nanoparticles with Antibacterial Activity of Copper Nanoparticles" in the National conference on Recent trends of Research in Physics, held at Department of Physics, Tripura University, Tripura, during 3- 4th Feb., 2012.

16. **Oral presentation** on "Synthesis of a few noble metal nanoparticles by reduction method to study the optical properties and their application as antibacterial agents" in the National seminar on Frontier of research in Physics, held at Department of Physics, Karimganj College, Assam, during 22-24 Dec, 2011.

15. Participated in poster presentation in **International Conference on Advance Nanomaterials and Nanotechnology**, held at IIT Guwahati, during 8-10th December, 2011. Paper title: "Synthesis and Characterization of Linoleic Acid Capped Palladium Nanoparticles",

14. Delivered an **invited talk** "Nanotechnology" in the Seminar on X-ray Organised by Cachar Cancer Hospital and Research Center, Silchar, Assam on Nov 12, 2011.

13. Participated in **Winter School on Gravitation and Cosmology (WSGC)**, held at Department of Physics, Assam University, Silchar, Assam, during 5 th Feb-14 th Feb, 2011.

12. **Oral presentation** on "Photoluminescence Study of Silver and Gold Nanoparticles" in the National Seminar on Contemporary Trends of Research in Physical Sciences, held at Department of Physics, G. C. College, Silchar, Assam, during Feb. 11-12, 2011.

11. Presented a poster entitled "UV-Vis and FTIR Spectral Study of Copper and Gold Nanoparticles" in the National Seminar on Current Trends in Condensed Matter Physics (CTCMP-2011) held at Department of Physics, Assam University, Silchar, during 3-5 Feb, 2011.

10. Participated in a poster presentation in the **International conference on nanomaterials and nanotechnology**, held at K.S.R. College of Technology, Tiruchengode, Tamil Nadu, during Dec 13-16, 2010. Paper title: "Characterization of linoleic acid capped copper nanoparticles".

9. Presented a poster entitled "Synthesis of linoleic acid capped silver and copper nanoparticles and their antibacterial activity" in the ICMS-Cambridge University Winter School on International Physics and Chemistry of Materials" held at Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), Bangalore, during Dec 06 th -10th, 2010.

8. Presented a poster entitled "Impedance Study of Micron Sized and Nanosized Iron and Copper Particles and Their Mixture" in the National Conference on Condensed Matter Physics (With a focus on Bose Einstein condensation and nanoparticles), held at Department of Physics, NEHU, Shillong, during March 22-23, 2010.

7. **Oral presentation** in National Seminar on Condensed Matter Physics, held at Department of Physics, Tripura University, Tripura, on February 16, 2010. Paper title: "Impedance Analysis of Small Iron and Copper Particles and Their Mixture in Paraffin".

6. **Oral presentation** on "Impedance Analysis of Small Iron and Copper Particles and Their Mixture in Paraffin" in the UGC Sponsored National Seminar on Problems and Prospects of Development in the National North East Region held at S. S. College, Hailakandi, Assam, during 1st -2nd Feb.,2010.

5. Presented a poster entitled "Synthesis of gold nanoparticles and its characterization" in the Indo- Russian Workshop on Nanotechnology International and Laser Induced Plasma, held at Department of Physics, Delhi University, Delhi, during.November 24-26, 2009.

4. **Oral presentation** on "Synthesis and Characterization of silver nanoparticles" in the UGC and DST sponsored National Seminar on Recent Progress in Physical Sciences, Organised by Department of Physics, Karimganj College, Karimganj, Assam, during December 20-21, 2008.

3. Participated in a one day workshop on **IUAC acquaintance program**, held at Dept of Physics, NIT, Silchar, Assam on 8th Feb, 2008.

2 . Presented a paper entitled "Synthesis and characterization of noble metal Nanoparticles" in the National seminar on Astrophysics with spectroscopic and photometric data, Organised by Dept. of Physics, Assam University, Silchar, Assam on 1st Feb, 2008.

1. Participated in poster presentation in **National Seminar on Photonics and Quantum Structures**, held at Department of Physics, Tezpur University, Tezpur, Assam during, November 4-6, 2009. Paper title: "Synthesis of Silver Nanoparticles and Their Characterization"

Faculty development program attended/ Refresher Course/ Workshop/School

1. **Refresher Course at Hyderabad University in 2015**
2. **Online Refresher Course at JNU in 2021**
3. **Orientation Course at Manipur University in 2015**