Dr. Jitumani Rajbongshi, MSc; Ph.D.
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Professional Summary

An experienced academic and researcher with over 13 years in Bioinorganic chemistry, electrochemistry, analytical chemistry, and green chemistry. Specializes in the spectroscopic and electrochemical studies of metalloproteins, focusing on electron transfer processes and sustainable practices. Research thirst aligns with Electrochemistry of inorganic complexes, addressing real-world challenges and Green Chemistry with an emphasis on waste-to-wealth practices. Experienced in undergraduate and postgraduate teaching, curriculum development, and institutional research projects.

Education

Ph.D. in Bioinorganic Chemistry (2006-2011)
Gauhati University, Assam, India

- Thesis: *Spectroscopic, Kinetic, and Electrochemical Studies of Respiratory Electron Transfer Proteins*
- Supervisors*: Prof. D.K. Das (Gauhati University), Prof. Shyamalava Mazumdar (TIFR, Mumbai)*

M.Sc. in Chemistry (2006)
Gauhati University, Assam, India

- First Class with Specialization in Inorganic Chemistry
- GATE Qualification (2006)
- Dissertation: *PVP and ZSM 5 Film modified GC Electrode and its application as Sensor*" under supervision of Prof. D.K. Das (Gauhati University. Guwahati)

B.Sc. in Chemistry (2004)
Pandu College, Gauhati University, Assam, India

- First Class
- Chemistry (Honors) with Royal combination

HS Science (2000)
Cotton College, Assam, India

- First Division

HSLC (1998)
Cotton College, Assam, India

- First Division with Star mark

Professional Experience

Associate Professor

- Department of Chemistry, Bhattadev University (June, 2019 – Present)
- Teach undergraduate and postgraduate courses, focusing on Inorganic Chemistry, Analytical Chemistry, Green Chemistry and Environmental Chemistry
- Coordinator of the Institutional Biotech Hub sponsored by DBT (2015-2019).
- Involved in examination duties, curriculum design, and research project supervision.

Assistant Registrar(i/c)
Office of the Registrar, Bhattadev University (December, 2019 – January, 2022**)**

- Involved in documentation process of the initial stage of Bhattadev University upgraded from erstwhile Bajali College.
- Procurement of Instruments for various departments of Bhattadev University
- Involved in whole sanitization process of the University during COVID-19 Period including preparation of sanitizers from Chemistry Lab.

Assistant Professor

- Department of Chemistry, Bajali College (April, 2013 – June, 2019)
- Teach undergraduate and postgraduate courses, focusing on Inorganic Chemistry, Analytical Chemistry, Green Chemistry and Environmental Chemistry
- Coordinator of the Institutional Biotech Hub sponsored by DBT (2015-2019).

Involved in examination duties, curriculum design, and research project supervision

Assistant Professor
Girijananda Choudhury Institute of Management and Technology, Guwahati (2011 – 2013)

- Taught undergraduate chemistry courses and contributed to institutional development.
- Involved in examination duties, curriculum design, and research project supervision.

Objective and Research Interests

- To pursue challenging, innovative research in the inter-disciplinary area of inorganic chemistry and biology through experiments and make a mark in the field of bioinorganic chemistry.

- Protein engineering and Spectro electrochemical studies of proteins exploring structure and function relationship.
- Electrochemistry of inorganic complexes, addressing real-world challenges.
- Green Chemistry with an emphasis on waste-to-wealth practices.

Selective Research Highlight

- **Site-Directed Mutagenesis of the CuA Domain:** Investigated the effects of targeted mutations on redox properties and structural stability of the CuA center. Additionally, engineered a blue copper active site within a purple copper protein scaffold through rational protein design (Tata Institute of Fundamental Research, Mumbai, 2009).
- **Artificial Peroxidase Development:** Examined the catalytic potential of the V49D/M69A *cytochrome* c_{552} mutant as an artificial peroxidase, focusing on structure–function relationships (Nagoya University, Japan, 2008).
- **Direct Electrochemistry of CuA Proteins:** Performed electrochemical characterization of CuA proteins from *Thermus thermophilus* on modified electrode surfaces, emphasizing electron transfer behavior (Tata Institute of Fundamental Research, Mumbai, 2007).
- **Inorganic Synthesis of Iron–Sulfur Clusters:** Synthesized and spectroscopically characterized iron–sulfur cluster complexes relevant to biological systems (Gauhati University, Guwahati, 2007).
- **Electrochemistry:** Experience in electrochemical techniques for studying redox-active biomolecules and coordination compounds & designing electrochemical sensors. (Bhattadev University)
- **Green Nanomaterial Synthesis:** Developed environmentally benign methods for the synthesis and characterization of copper and silver nanoparticles. (Bhattadev University)
- **Sustainable Materials Design:** Designed value-added functional materials derived from waste resources, with an emphasis on sustainability and circular economy principles. (Bhattadev University)

Current and ongoing research emphasizes:

- ✓ Development of **electrochemical sensors** for nutrient and pollutant monitoring (nitrate, phosphate, heavy metals)
- ✓ Investigation of **redox-active biomolecules** relevant to neuroprotection and disease mechanisms
- ✓ Exploration of **phytochemicals and indigenous medicinal plants** as sources of bioactive and redox-active compounds
- ✓ Systems-level perspectives through **metabolomics, proteomics, and microbial consortia analysis**

Awards and Fellowships

- Senior Research Fellowship, CSIR (2010)
- G-COE Fellowship, Nagoya University, Japan (2008)
- Junior Research Fellowship, DST-funded project (2007)
- State Merit Scholarship for matriculation (1999)

Projects Investigated

1. **Voltammetric and Spectroscopic Studies of the CuA Site from Cytochrome c Oxidase and Its Mutants**
   Funding Agency: AICTE
   File No.: 8023/RID/RPS/11/11/12
   Sanction Date: April 12, 2012
   Amount: ₹15,00,000
   Duration: April 1, 2012 – November 20, 2013

2. **Establishment of Institutional Biotech Hub (IBT Hubs) under DBT's Special Programme for North Eastern States of India**
   File No.: BT/32/NE/2012 (05)

   Funding Agency: DBT
   Sanction Date: September 19, 2013
   Amount: ₹39,50,000
   Duration: April, 2015 – November, 2019

3. **The project DBT-NER Institutional Biotech Hub at Bhattadev University, Bajali, Assam (Phase-II)** (Co-PI)
   File No.: BT/NER/143/SP44456/2021
   Funding Agency: DBT
   Sanction Date: 09 March, 2023

Amount: ₹ 31,55,200/-
Duration: 09 March 2023 – 09 March 2026

Lab Visit

- Visited Graduate School of Science, Nagoya University, Japan to work in the Collaborative project on "Study of V49D/M69A, a c552 mutant, as an artificial peroxidase" with Professor Yoshihito Watanabe under the G- COE fellowship from May – July 2008.
- Worked in the department of Chemical sciences, Tata Institute of Fundamental Research on the structure and function relationship of CuA protein of Cytochrome ba3 from *Thermus thermophilous* under DST Project (2007-2011)
- Visited Department of Chemistry, IIT Roorkee, Uttarakhand, India (2017)

Research Publications

1. Basumatary, M.J., Rajbongshi, J., Electrochemical Nitrate Detection Using Copper Glycinate Complex Repurposed from Laboratory Experiment By-products, ***Discover Chemistry***, 3:182 (2026).

2. Layal, H., Rajbongshi, J., Kumar, R., Pandey, S., Mishra, R., Yadav, P.K., Hydrogen Sulfide in the Brain as a Silent Neuroprotector in Alzheimer's Disease, ***Neuroscience*****,** 585, 181–197 (2025).

3. Yadav, P.K., Barman, S., Rajbongshi, J., Mishra, R., Mhaske, S., Sudhamalla, B., A Unique Ceruloplasmin Shows Distinct Redox Potentials for the Catalytic and Electron-Transfer Metal Sites, ***Peptide Science*****,** 117(1), e24387 (2025).

4. Basumatary, M.J., Kalita, D., Sarma, R.L., Rajbongshi, J., Ferrioxalate Complex Derived Electrochemical Sensor for Nitrate and Phosphate Ions Detection, ***Asian Journal of Chemistry***, 37(12), 3019–3024 (2025).

5. Sonowal, S., Barman, A., Gogoi, A., Patgiri, R., Haloi, A.K., Das, K., Rajbongshi, J., A Chemically Informed Framework for Microbial Consortia Analysis Beyond Sequences: A Narrative Review, ***Indian Journal of Microbiology Research***, 12(4), 449–459 (2025).

6. Gowtham, N., Bartaria, D., Hao, P.T., Devi, P.P., Singh, S., Rajbongshi, J., Metabolomics and Proteomics in Disease Biomarker Discovery: A Bioanalytical Approach, ***Journal of Applied Bioanalysis***, 11(4), 1085–1091 (2025).

7. Roy, S.C., Rajbongshi, J., Phytochemical and Therapeutic Profiling of Selected Medicinal Plants Used by Indigenous Communities in Pathsala, Assam, ***Journal of Advancement in Agricultural Research***, 3(7), 229-249 (2025).

8. Rajbongshi, J., Das, D.K., Mazumdar, S., Spectroscopic and Electrochemical Studies of the pH-Induced Transition in the CuA Centre from *Thermus thermophilus*, ***Inorganica Chimica Acta***, 533, 120749 (2022).

9. Choudhury, D.K., Barman, T., Rajbongshi, J., Qualitative Phytochemical Screening and GC-MS Analysis of *Musa sapientum* Spadix, ***Journal of Pharmacognosy and Phytochemistry***, 8(1), 2456-2460 (2019).

10. Behera, R.K., Nakajima, H., Rajbongshi, J., Watanabe, Y., Mazumdar, S., Thermodynamic Effects of the Alteration of the Axial Ligand on the Unfolding of Thermostable Cytochrome c, ***Biochemistry*****,** 52(8), 1373-1384 (2013).

11. Ghosh, M.K., Rajbongshi, J., Basumatary, D., Mazumdar, S., Role of the Surface-Exposed Leucine 155 in the Metal Ion Binding Loop of the CuA Domain of Cytochrome c Oxidase from *Thermus thermophilus* on Function, ***Biochemistry***, 51(12), 2443-2452 (2012).

12. Rajbongshi, J., Ghosh, M.K., Sanghamitra, N.J.M., Gupta, S., Mazumdar, S., Conformational Properties of the Bis-μ-(thiolato) Dicopper Center in Cytochrome c Oxidase, ***NISCAIR-CSIR***, India (2012).

13. Rajbongshi, J., Das, D.K., Mazumdar, S., Direct Electrochemistry of Dinuclear CuA Fragment from Cytochrome c Oxidase of *Thermus thermophilus* at Surfactant Modified Glassy Carbon Electrode, ***Electrochimica Acta***, 55(13), 4174-4179 (2010).

14. Nakajima, H., Ichikawa, Y., Satake, Y., Takatani, N., Manna, S.K., Rajbongshi, J., et al., Engineering of *Thermus thermophilus* Cytochrome c552: Thermally Tolerant Artificial Peroxidase, ***ChemBioChem*****,** 9(18), 2954-2957 (2008).

Books and Book Chapters

1. Rajbongshi, J., *Emerging Researches in Chemical Sciences* (Book Chapter), Research & Innovation Cell, Anundoram Borooah Academy Degree College, ISBN: 978-93-90706-89-1 (2024).
2. Rajbongshi, J., *Diganta… The Legacy in Bond* (Book), Sanjiwan Prakashan, Guwahati, ISBN: 978-81-958909-6-5 (May 2025).
3. Rajbongshi, J., The Dinuclear CuA Centre of Cytochrome c Oxidase as a Typical Protein: A Narrative Review, *Emerging Researches in Chemical Sciences*, pp. 358–376, ISBN: 978-93-90706-89-1 (2023).
4. Rajbongshi, J., Modulation in Subunit II of Cytochrome c Oxidase Through Genetic Engineering Approach, *Anandam*, pp. 1–7, ISSN: 2321-8800 (2021).

5. Rajbongshi, J., Spectroscopic, Kinetic and Electrochemical Studies of Respiratory Electron Transfer Proteins, *Summary of Doctoral Theses*, Vol. 5, ISBN: 978-81-920635-5-3 (2013).
6. Rajbongshi, J., Genetic Engineering of the Metal Ion Binding Site in the Dinuclear CuA Centre of Cytochrome c Oxidase, *Academica Bajali*, Vol. 2, ISSN: 234-98-374 (2015).
7. Rajbongshi, J., Effect of Site-Specific Mutation in the Loop Region of the Dinuclear CuA Centre of *Thermus thermophilus*: Studies on L155R Mutant, *Academica Bajali*, Vol. 3, ISSN: 234-98-374 (2016).
8. Rajbongshi, J., Venkataraman Ramakrishnan, Ekuri Pondharajan, *Nobel Bota Bijoyee*, ISBN: 978-93-244-0671-2 (2016).
9. Rajbongshi, J., Application of Chemistry in Everyday Life, *Bigyan Saundarya*, ISBN: 978-81-933681-0-7 (2017).

Invited Lectures, Presentations, and Academic Participation

1. Delivered an invited lecture entitled *"pH-Dependent Electrochemical Sensing of Glycine and Alanine Using Ferrocene-Modified Glassy Carbon Electrode"* at the *International Conference on Innovation and Advances in Chemical Sciences (IACS-2025)*, 25 January 2025.

2. Served as Resource Person and delivered a lecture entitled *"The Art of Microbial Culture: A Chemical Perspective"* during the Hands-on Training on Microbial Culture Techniques organized by the DBT-NER IBT Hub, Bhattadev University, 25–26 September 2024.

3. Delivered a lecture entitled *"The Nobel Prize in Chemistry 2024"* during the National Chemistry Day Celebration at Barnagar College, Sorbhog (in association with the Association of Chemistry Teachers, Mumbai), 10 December 2024.

4. Presented a paper entitled *"Role of Enzyme in Respiration"* at the National Seminar on Current Developments in Science and Technology, organized by Bhattadev University and sponsored by ASTEC, Assam.

5. Presented a paper at the National Seminar on Current Developments in Science and Technology, Bhattadev University, Pathsala (2023).

6. Presented a paper at the National Seminar on Recent Aspects of Chemistry Education and Research, Institute of Science and Technology, Gauhati University, Guwahati (2012).

7. Participated in the School on Advanced Biological Inorganic Chemistry (SaBIC-2009), Tata Institute of Fundamental Research, Mumbai, 2–4 November 2009.

8. Presented a poster at the 13th Biennial National Symposium on Modern Trends in Inorganic Chemistry (MTIC-XIII), Indian Institute of Science, Bangalore (2009).
9. Presented a paper at the School on Advanced Biological Inorganic Chemistry (SaBIC-2009), Tata Institute of Fundamental Research, Mumbai (2009).
10. Abstract accepted for poster presentation at the 14th International Conference on Biological Inorganic Chemistry (ICBIC-2009), Nagoya, Japan, 25–30 July 2009.
11. Presented a poster at the DCS Annual Meeting, Tata Institute of Fundamental Research, Mumbai (2008).
12. Presented a poster at the 12th Biennial National Symposium on Modern Trends in Inorganic Chemistry (MTIC-XII), Indian Institute of Technology Madras, Chennai, India (2007).
13. Participated in the DST-sponsored Winter School in Bioinorganic Chemistry, Indian Institute of Technology Bombay, Mumbai, 17–30 November 2007.

Professional Development

- FDP in Academic Research Writing (Delhi University, 2024)
- FDP on Outcome Based Education and Generative AI (Kerala State Higher Education Council, 2024)
- Participated in Online Workshop on Data Analytics & AI organized by Centre for Computer Science and Information Technology (CCSIT), Manjeri, University of Calicut, 2024)
- Refresher Course in Chemistry (Delhi University, 2023)
- Participated in workshops on chemical education, examination reforms, and curriculum development (Gauhati University, 2019)
- 113th Orientation Programme (Gauhati University, 2017)

Teaching Contributions and Experiences

- Developed and delivered courses in Inorganic Chemistry using participatory and innovative teaching methods at Bhattadev University, Pathsala (2013 onwards).
- Provided additional learning resources, including access to e-journals and reference materials at Bhattadev University, Pathsala (2013 onwards).

- Engaged in extensive mentoring and supervision of student projects at Bhattadev University, Pathsala (2013 onwards).
- Delivered an invited lecture at National Seminar on Emerging Trends in Chemistry, Department of Chemistry, Gauhati University, March 30-31, 2012
- Taught as Asstt. Professor in Chemistry at Girijananda Chowdhury Institute of Management and Technology, Azara, Ghy 17 (2011-2013)
- Delivered talk at TIFR on "Spectroscopic and electrochemical studies of CuA protein from Thermus thermophilus and its mutants" January, 24, 2011.
- Taught Analytical Chemistry in the PGDAC course, Department of Chemistry, Gauhati University (2010-11).
- Demonstrated advanced protein electrochemistry at the School on Advanced Biological Inorganic Chemistry (SaBIC-2009), TIFR, Mumbai.
- Project instructed to Mr. Pritesh Krishnakumar, Department of Chemistry, MS University Baroda at TIFR, Mumbai, India, (November-December), 2007
- Project tutored to Ms. Preshita Puja Desai, undergraduate student from D.Y Patil College, Mumbai at TIFR, Mumbai, India, (June –July), 2007
- Project tutored to Mr. Somnath Bakshi, Department of Chemistry, IIT Kanpur at TIFR, Mumbai, India (May – June), 2007
- Taught chemistry in Sambhuram Das Tribel High School, Gondhmow, Kamrup, Assam, India (May – July), 2004

Co-curricular Contributions

- Coordinator, Institutional Biotech Hub (DBT Sponsored).
- Editor, Academica Bajali, a peer reviewed journal from Bajali College (2015-2017)
- Editor, Bigyan Saundarya, a Book on popular science (2017)
- Resource person at local schools for science exhibitions and outreach programs.
- Served on institutional committees for examinations, admissions, and university governance.
- Coordinator, Youth Conclave on Skill Sponsored by Rajiv Gandhi National Institute of Youth Development Institution of National Importance by the Act of Parliament No.35/12**, Ministry of Youth Affairs and Sports, GOI**

References

1. Prof. Hiroshi Nakajima, Graduate School of Science, Department of Chemistry, Nagoya University, Japan
   Email: hnakajima@mbox.chem.nagoya-u.ac.jp

2. Prof. Shyamalava Mazumdar, Department of Chemical Sciences, TIFR, Mumbai
Email: shyamal@tifr.res.in

"Feeding the faith and starving the fear"