

**Dr. Rabindra Nath Pradhan**  
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### **OBJECTIVE:**

As a passionate and highly creative individual, I urge to become a part of the fast-growing scientific world and utilize my experience and skills in multidisciplinary applied research.

### **ACADEMIC BACKGROUND**

2021 November – Till date: Working as an Assistant professor at **Centurion University of Technology and Management, Paralakhemundi, Odisha** (India).

2019 July- 2021 October: Working as an Assistant professor at the **Regional Institute of Education, NCERT, Bhubaneswar** (India).

2020: Ph.D. from **Indian Institute of Technology (IIT) Bhubaneswar** [(Supervisor: Dr. Akhilesh Kumar Singh)].

2012: M. Sc. from **Utkal University** (India).

2010: B.Sc. (Chemistry Hons.) from **Utkal University** (India).

### **RESEARCH INTEREST**

Bio-Inorganic Chemistry, Medicinal Inorganic Chemistry, Stabilization of Unusual High Oxidation States of Metal Ions, Supramolecular Self-Assembly, Metallo-supramolecular Chemistry, Magneto-chemistry, Luminescence chemosensors.

### **RESEARCH EXPERTISE:**

#### ➤ **Chemistry:**

- ❖ Multi-step Organic Synthesis and Inorganic synthesis carried out air and moisture-sensitive reaction by using Glove Box and standard Schleck line techniques.
- ❖ Purification of compounds by using various chromatography techniques.
- ❖ Proficient in characterization and analysis of samples by using NMR spectroscopy, Mass Spectrometry, FT-IR, Elemental Analysis (CHN), UV-Vis spectrophotometer, Fluorescence spectroscopy, X-ray crystallography, Cyclic Voltammetry.

➤ **Technical:**

- ❖ Experience in handling single crystal X-ray diffractometer (Bruker APEX SMART D8 Venture CCD diffractometer), NMR (Bruker AVANCE 400 MHz), FT-IR (BRUKER ALPHA-T), CHN analyzer (Elementar vario MICRO cube), UV-Vis spectrophotometer (Perkin-Elmer), Fluorescence spectrophotometer (Fluoromax 4P), Electrochemical work station (CH instruments), Glove Box (MBRAUN), TGA (Perkin-Elmer), Quantum Design PPMS magnetometer instruments.

➤ **Computing & Software**

Bruker APEX III, WINGX, PLATON, MERCURY, DIAMOND, CHEM DRAW, ORIGIN, FITMART (magnetic data fitting) and Endnote X9.

**ACADEMIC ACHIEVEMENTS:**

- ❖ Qualified **UGC-JRF** in Joint CSIR–UGC National Eligibility Test conducted by Council of Scientific and Industrial Research June 2012 (**All India Rank-092**).
- ❖ Qualified Graduate Aptitude Test in Engineering (**GATE**) in March 2013, conducted by Indian Institute of Technology, Bombay, India.
- ❖ **Gold medallist** in MSc 2012 batch in chemistry, Department of Chemistry Utkal University.

**SHORT SUMMARY OF RESEARCH:**

My research is focused to develop T1- and paraCEST-based MRI contrast agents using both acyclic and macrocyclic ligands. The ligands are synthesized by multistep organic synthesis and characterized by different spectroscopic techniques, such as NMR, IR, Mass, and UV-Vis spectroscopy. After successfully synthesizing ligands, the Gd(III) complexes were synthesized for the T1 MRI contrast agent, and Eu(III), Fe(II), Co(II), and Ni(II) complexes are synthesized for paraCEST-based MRI contrast agent. As my work is focused on the development of MRI contrast agents, all the experiments are done by using NMR techniques. Longitudinal relaxation rate constant for water protons both in the absence and presence of complexes were measured using the inversion recovery method. The para-CEST properties of the complexes are measured by using the CEST pulse. CEST z-spectra are obtained by plotting normalized ( $100 \times M_z / M_0$ ) water signal intensities as a function of the presaturation pulse frequency offset from the bulk water, which is arbitrarily set to 0 ppm.  $M_z$  is the intensity of water protons or the net magnetization of water protons after the application of presaturation frequency ( $\Delta\omega$ ) and  $M_0$  is the maximum intensity of water signal or net magnetization at thermal equilibrium when no saturation of water occurs. The stability of the complexes is determined by using the NMR titration method. The magnetic moment of the

complexes is measured by using 1D NMR spectra. 1D NMR is also used to monitor the shifting of different peaks at the variation of temperature and PH. 2D NMR is used for the detection of different interactions between ligands and complex protons.

## **RESEARCH PUBLICATIONS:**

1. **Rabindra Nath Pradhan**, Sayed Muktar Hossain, Avinash Lakma, Dragana Stojkov, Tatjana Verbić, Goran Angelovski, Rosa Pujales Paradela, Carlos Platas Iglesias and Akhilesh Kumar Singh\*, “Water Soluble Eu(III) Complexes of Macrocyclic Triamide Ligands: Structure, Stability, Luminescence and Redox Properties”, *Inorg. Chem. Acta* 2019, **486**, 252.
2. **Rabindra Nath Pradhan**, Subhayan Chakraborty, Pratibha Bharti, Janesh Kumar, Arindam Ghosh\* and Akhilesh K. Singh\*, “Seven coordinate Co(II) and six coordinate Ni(II) complexes of an aromatic macrocyclic triamide ligand as paraCEST agents for MRI”, *Dalton Trans.*, 2019, **48**, 8899–8910.
3. **Rabindra N. Pradhan**, Pietro Irrera, Feriel Romdhane, Suvam Kumar Panda, Dario Livio Longo, Julia Torres, Carlos Kremer, Anshul Assaiya, Janesh Kumar, and Akhilesh K. Singh\*, “Di-Pyridine-Containing Macrocyclic Triamide Fe(II) and Ni(II) Complexes as ParaCEST Agents” *Inorg. Chem.* 2022, **61**, 16650–16663.
4. Sayed Muktar Hossain, Avinash Lakma, **Rabindra Nath Pradhan**, Ayon Chakraborty, Ashis Biswas and Akhilesh Kumar Singh\*, “Synthesis and Characterization of a Novel, Ditopic, Reversible and Highly Selective, “Turn-On” Fluorescent Chemosensor for Al<sup>3+</sup> Ion”, *RSC Adv.* 2015, **5**, 63338–63344.
5. Avinash Lakma, Sayed Muktar Hossain, **Rabindra Nath Pradhan**, Dinesh Topwal, Andrea Cornia and Akhilesh Kumar Singh\*, “Expansion of a Discrete [3 × 3] Mn<sub>9</sub> Metallogrid to a μ-Carboxylato-Bridged Polymeric {Mn<sub>11</sub>}<sub>n</sub> Assembly” *Eur. J. Inorg. Chem.* 2016, **2016**, 2993-2999.
6. Sayed Muktar Hossain, Kalpana Singh, Avinash Lakma, **Rabindra Nath Pradhan** and Akhilesh Kumar Singh\*, “A Schiff Base Ligand of Coumarin Derivative as an ICT-Based Fluorescence Chemosensor for Al<sup>3+</sup>”, *Sensors and Actuators B* 2017, **239**, 1109-1117.
7. Sayed Muktar Hossain<sup>§</sup>, Avinash Lakma<sup>§</sup>, **Rabindra Nath Pradhan**, Serhiy Demeshko and Akhilesh Kumar Singh\*, “Valence directed binding mode of [2 × 2] iron grids of an unsymmetrical picolinic hydrazone based ligand”, *Dalton Trans.* 2017, **46**, 12612.
8. Avinash Lakma, Sayed Muktar Hossain, **Rabindra Nath Pradhan** and Akhilesh Kumar singh\*, “Metal Directed Self-Assembly of Tetra Nuclear CuII and NiII Clusters”, *J. Chem. Sci.* 2018, **230**, 80.
9. Avinash Lakma, **Rabindra Nath Pradhan**, Sayed Muktar Hossain, Jan van Leusen, Paul Kögerler, and Akhilesh Kumar Singh\*, “Synthesis, Structure and Magnetic Properties of Ni(II) and Cu(II) [2x2] Grid Complexes of Pyrimidine-Based Symmetric Ditopic Ligands”, *Inorg. Chem. Acta* 2019, **486**, 88.

10. Narayan Gouda, **Rabindra Nath Pradhan**\*, “Pyrene Based Schiff Base Ligand: A Highly Selective Fluorescence Chemosensor for the Detection of Cu<sup>2+</sup> ions” *J. Indian Chem. Soc.* 2023, **100**, 100985.
11. Dr. Rabindra Nath Pradhan, Suvam Kumar Panda, Prof. Julia Torres, Prof. Carlos Kremer, Shrutika Kavali, Dr. Neelima Dubey, Dr. Suprava Naik, and Dr. Akhilesh Kumar Singh\* “A Mono-aquated Di-pyridine-based Gd(III) Complex as T1-weighted MRI Probe with High Relaxivity and Stability” (**Manuscript under revision under *Eur. J. Inorg. Chem.***).

#### **CONFERENCES/SYMPOSIA/POSTER PRESENTATION:**

1. Avinash Lakma, Sayed Muktar Hossain, **Rabindra Nath Pradhan**, Akhilesh Kumar Singh\*. Synthesis and Characterization of High Dimensional 2 x [2 x 2] Grid Type Co Metal Complex: A Magnetic Perspective. Nation Conference on “*Advances in Chemistry and their Biological and Industrial Relevance: ACBIR - 2014*”. January 10-11, 2014, NIT Rourkela, Rourkela, INDIA.
2. **Rabindra Nath Pradhan**, Akhilesh Kumar Singh\*. Syntheses and Their Applications of MRI Contrast Agents. Poster presentation on “*National Science Day*” February 28, 2015 at IIT Bhubaneswar.

#### **PERSONAL DETAILS**

Full Name:	Rabindra Nath Pradhan
Sex:	Male
Marital status:	Single
Date of birth:	April 09, 1986
Nationality:	Indian
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