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Academic Qualifications:

Examination	Institute/ University/ Organization	Year of Joining	Year of Passing
B.Sc.	The University of Burdwan	2005	2008
M.Sc.	The University of Burdwan	2008	2010
Ph. D	JadavpurUniversity	2010	2016

Academic Awards:

(i) Qualified National Eligibility Test (NET) in 2010 and awarded with JRF & SRF in the year 2010 and 2012, respectively.

(ii) Awarded with the National Post-Doctoral Fellowship (N-PDF) by SERB in 2017.

Thesis Title: Synthesis of New Polypyridine Ruthenium and Osmium Complexes as Anion Sensors, DNA Binders and Logic Devices.

Summary of Doctoral Research Work:

My doctoral research work mainly dealt with the synthesis of polypyridine based metal complexes of Ru(II) and Os(II) and study of their photophysical and electrochemical properties. In this regard a series of monometallic as well as homo- and heterobimetallic ruthenium(II) and osmium(II) complexes were synthesized from different ligands and characterized thoroughly by using standard analytical and spectroscopic techniques including X-ray crystallography. The absorption spectra, redox behavior, and both steady state and time-resolved luminescence properties of the compounds were investigated. Anion- and cation-induced switching of the physicochemical properties of the ligands as well as the

metal complexes were studied in solution through different channels. The imidazole N-H protons present in the second coordination sphere become much acidic on coordination of the ligands with the metal centers. In few complexes these N-H protons were beautifully utilized for the sensing of cyanide ion in pure aqueous medium with very low detection limit. Moreover, based on absorption, and emission spectral responses towards selected anionic and cation inputs, the designing of different molecular logic devices were also explored. Also, due to the presence of planar pi-expansive pyrene moiety in the complexes, some of them interact strongly with DNA. They bind with DNA in intercalative fashion and this mode of binding is most important for many biological applications. Consequently, binding affinities of the complexes towards CT-DNA were thoroughly studied through different methods such as absorption, emission, excited state lifetime, circular dichroism, thermal denaturation of DNA and relative DNA binding study using ethidium bromide. Finally, density functional theory (DFT) and time dependent DFT (TDDFT) calculations of the compounds were carried out to gain a better understanding of the electronic structure and optical properties of the complexes.

. **Research Interest**:

(i) Design and Synthesis of Light Harvesting Compounds.

(ii) Characterization, Photophysical and Electrochemical Properties of Synthesized Coordination Compounds.

(iii) Anion and Cation Sensing.

(iv) DNA Interaction with Metal Complexes.

(v) Intercomponent Energy and Electron Transfer Process.

Research Seminars Attended/ Poster Presentation:

(i) ‘Structural Chemistry of Molecular and Materials’, organized by University of Calcutta, Jadavpur University, IISER Kolkata, RSC.

(ii) ‘Mordern Trends in Inorganic Chemistry-XVI(MTIC-XVI)’, organized by Department of Chemistry, JadavpurUniversity.

(iii) ‘Spectroscopy, Theoretical Chemistry and Chemistry of Materials’, organized by IISER Kolkata.

(iv) ‘Chemistry of Functional Materials of Current Interest’, organized by Department of Chemistry, JadavpurUniversity.

List of Publications:

(i) **Mardanya, S**.; Mondal, D.; Baitalik, S. "Bimetallic Ru(II) and Os(II) Complexes Based on a Pyrene-bisimidazole Spacer: Synthesis, Photophysics, Electrochemistry and Multisignalling DNA Binding Studies in the Near Infrared Region". *Dalton Trans.*, **2017**, *46*, 17010–17024.

(ii) **Mardanya, S**.; Karmakar, S.; Mondal, D.; Baitalik, S. "Smart Ruthenium and Osmium Complexes Mimic the Complicated Functions of Traffic Signal and Memory Device." *Sensors and Actuators B.*,**2017**, *239*, 635-641.

(iii) **Mardanya, S**.; Karmakar,S.; Das, S.; Baitalik, S. "Anion and Cation Triggered Modulation of Optical Properties of a Pyridyl-imidazole Receptor Rigidly Linked to Pyrene and Construction of INHIBIT, OR and XOR Molecular Logic Gates: A Combined Experimental and DFT/TD-DFT Investigation".*Sensors and Actuators B.*, **2015**, *206*, 701–713.

(iv) **Mardanya, S**.; Karmakar, S.;Maity, D.; Baitalik, S. "Ruthenium(II) and Osmium(II) Mixed Chelates Based on Pyrenyl−Pyridylimidazole and 2,2′-Bipyridine Ligands as Efficient DNA Intercalators and Anion Sensors". *Inorg. Chem.*,**2015,***54*, 513−526.

(v) **Mardanya, S**.; Karmakar,S.; Mondal, D.; Baitalik, S. "An Imidazolyl-pyreno-imidazole Conjugate as Cyanide Sensor and Set-Reset Memorized Sequential Logic Device". *Dalton Trans.*, **2015**, *44*, 15994-16012.

(vi) **Mardanya, S**.; Karmakar, S.; Bar, M.; Baitalik, S. "Pyrene-biimidazole Based Ru(II) and Os(II) Complexes as Highly Efficient Probes for the Visible and Near-infrared Detection of Cyanide in Aqueous Media". *Dalton Trans.*, **2015**, *44*, 21053–21072.

(vii) **Mardanya, S**.; Karmakar,S.; Mondal, D.; Baitalik, S. "Homo- and Heterobimetallic Ru(II) and Os(II) Complexes Based on Pyrene-biimidazolate Spacer as Efficient DNA Binding Probes with Molecular Light Switch Behaviors in the Near Infrared Domain". *Inorg. Chem.*,**2016,***55*, 3475−3489.

(viii) Karmakar,S.; Maity, D.; **Mardanya, S**.; Baitalik. S. "Pyrene and Imidazole Functionalized Luminescent Bimetallic Ru(II) Terpyridine Complexes as Efficient Optical Chemosensors for Cyanide in Aqueous, Organic and Solid Media". *Dalton Trans.*, **2015**, *44*, 18607-18623.

(ix) Karmakar,S.; **Mardanya, S**.; Pal, P.; Baitalik. S. "The Design of Multichannel Osmium-Based Metalloreceptor for Anions and Cations by Taking Profit from Metal-Ligand Interaction and Construction of Molecular Key-Pad Lock and Memory Device". *Inorg. Chem.*, **2015**, *54*, 11813-11825.

(x) Karmakar,S.; **Mardanya, S**.; Maity, D.; Baitalik. S. "Polypyridyl-imidazole Based Os(II) Complex as Optical Chemosensor for Anions and Cations and Multi-readout Molecular Logic Gates and Memory Device: Experimental and DFT/TDDFT Study". *Sensors and Actuators B.*,**2016**, *226*, 388-402.

(xi) Maity, D.; **Mardanya, S**.; Karmakar, S.;Baitalik, S. "pH-Induced Processes in Wire-like Multichromophoric Homo- and Heterotrimetallic Complexes of Fe(II), Ru(II), and Os(II)". *Dalton Trans.*,**2015**, *44*, 10048–10059.

(xii) Karmakar, S.;**Mardanya, S**.; Das, S.; Baitalik, S. "Efficient Deep-Blue Emittier and Molecular-Scale Memory Device Based on Dipyridyl-Phenylimidazole-Terpyridine Assembly".*J. Phys. Chem. C.*,**2015,***119*, 6793-6805.

(xiii) Karmakar,S.; Maity, D.; **Mardanya, S**.; Baitalik. S. **"**Multichromophoric Bimetallic Ru(II) Terpyridine Complexes Based on Pyrenyl-bis Phenylimidazole Spacer: Synthesis, Photophysics, Spectroelectrochemistry, and TD-DFT Calculations".*Inorg. Chem.*,**2014**, *53*, 12036−12049.

(xiv) Karmakar,S.; Maity, D.; **Mardanya, S**.; Baitalik, S. "Demonstration of Multiple Logic Operations in a Heteroditopic Pyrene−phenylimidazole−terpyridine Conjugate Based on Optical Responses by Selective Anions and Cations: An Experimental and Theoretical Investigation". *J. Phys. Chem. A.*,**2014**, *118*, 9397−9410.

(xv) Maity, D.; Bhaumik, C.; **Mardanya, S**.; Karmakar, S.; Baitalik, S. "Light Harvesting and Directional Energy Transfer in Long-lived Homo- and Heterotrimetallic Complexes of Fe^{II}, Ru^{II}, and Os^{II}". *Chem. Eur. J.*,**2014**, *20*, 13242 – 13252.

(xvi) Das,S.; Karmakar, S.; **Mardanya, S**.; Baitalik, S."Synthesis, Structural Characterization, and Multichannel Anion and Cation Sensing Studies of a Bifunctional Ru(II) Polypyridyl–Imidazole Based Receptor". *Dalton Trans.*,**2014**,*43*, 3767-3782.

(xvii) Das,S.; Karmakar, S.; **Mardanya, S**.; Saha, D.; Baitalik, S. "Cation-induced Switching On-off Luminescence in an Imidazole 4,5–dicarboxylate–bridged $Ru^{II}Os^{II}$ Bipyridine Complex: A Combined Experimental and DFT/TDDFT Investigation". *Polyhedron.*,**2014**, *76*, 55-70.

(xviii) Maity, D.; Das, S.; **Mardanya, S**.; Baitalik, S. "Synthesis, Structural Characterization, and Photophysical, Spectroelectrochemical, and Anion-Sensing Studies of Heteroleptic Ru(II) Complexes Derived from 4′-Polyaromatic Substituted

Terpyridine Derivatives and 2, 6-Bis(Benzimidazole-2-yl)Pyridine". *Inorg. Chem.*,**2013**, *52*, 6820-6838.

(xix) Das, S.; Saha, D.; **Mardanya, S**.; Baitalik, S. "A Combined Experimental and DFT/TDDFT Investigation of Structural, Electronic, and pH-Induced Tuning of Photophysical and Redox Properties of Osmium(II) Mixed-Chelates Derived from Imidazole-4,5-Dicarboxylic Acid and 2, 2′-Bipyridine". *Dalton Trans.*,**2012**, *41*, 12296-12310.

(xx) Saha, D.; Das, S.;**Mardanya, S**.; Baitalik, S.* "Structural Characterization and Spectroelectrochemical, Anion Sensing and Solvent Dependence Photophysical Studies of a Bimetallic Ru(II) Complex Derived from 1,3-Di(1*H*-Imidazo[4,5-f][1,10] Phenanthroline-2-yl)Benzene".*Dalton Trans.*,**2012**, *41*, 8886-8898.

(xxi) Mondal, P.; Ghorui, U. K.; Satra, J.; **Mardanya, S**.; Srivastava, D. N.; Bhadu, G. R.; Adhikary, B.*"$AgVO_3$ Nanorods Decorated with Polypyrrole and Tetraphenylporphyrin as Ternary Catalysts for Oxygen Electrode Reactions". *ACS Appl, Nano. Mat.***2020**, *3*, 3876-3891.

(xxii) Ghorui, U. K.; Satra, J.; Mondal, P.; **Mardanya, S**.; Sarkar, A.; Srivastava, D. N.; Adhikary, B.; * Mondal, A. * " Graphitic Carbon Nitride Embedded-Ag Nanoparticle Decorated-$ZnWO_4$ Nanocomposite-Based Photoluminescence Sensing of Hg^{2+}". *Mater. Adv.*, **2021**, *2*, 4041-4057.