Biodata

Name : **Dr. Srikanta Patra**
Date of Birth : *02/02/1975*
Assistant Professor of Chemistry
School of Basic Sciences
Indian Institute of Technology Bhubaneswar - 751013
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Phone No. : +91-674-2576053, (o)
Fax: +91-674-2301983

Academic Profile

Sr.No.	Degree	University	Year	Subject	Percentage
1	PhD	Indian Institute of Technology Bombay	2005	Inorganic Chemistry	____
2	MSc	Maharaja Sayajirao University of Baroda	2001	Inorganic & Analytical Chemistry	68.1
3	BSc	University of Calcutta	1997	Industrial Chemistry	77.1

Scholarship and Awards

- Received **Outstanding Research Award** in Science for the year **2005**, IIT Bombay.
- Awarded **Senior Research Fellowship** by **UGC**, New Delhi, India in **2004**.
- Awarded **Junior Research Fellowship** by **CSIR** New Delhi, India in **2002**.
- Awarded **Junior Research Fellowship** by **UGC**, New Delhi, India in **2001**.
- Qualified in All India level Graduate Aptitude Test in Engineering (**GATE–2001**).
- Received **Minakshi Lalit** Award in Chemistry, by Gujarat Science Academy in **2000**.

Professional Experience

PhD

Thesis Title	:	**Mixed-Valency in Polyruthenium Systems**
Year	:	August, 2001 – November, 2005
Supervisor	:	**Prof. G. K. Lahiri**
Institute	:	Indian Institute of Technology, Bombay (IIT, Bombay)

Postdoc

Research Topic	:	**Small molecule activation using late transition metal complexes**
Year	:	2006–2007
Institute	:	The University of Iowa, USA
Research Topic	:	**Development of nanoparticle-based biosensor**
Year	:	2007–2009
Institute	:	Pusan National University, South Korea

Teaching

Theory : General Chemistry I, Chemistry of Materials, Design of Application of Nanomaterials, Analytical Chemistry, Physical Methods in Inorganic Chemistry

Laboratory : General Experiments for undergraduate and postgraduate laboratory: (Qualitative/Quantitative/Preparative).

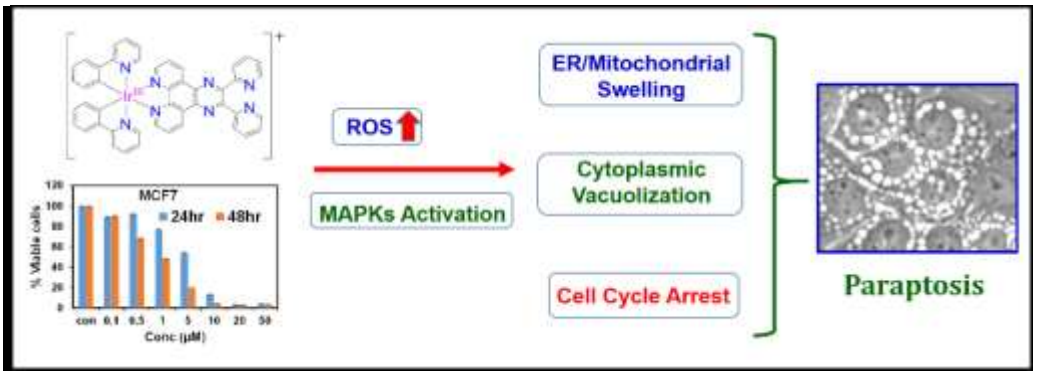
Research Interest

Broad Area : Coordination Chemistry & Materials Chemistry
Specific Area : Metal mediated organic transformation, Metal based drugs, Functional materials
Publications : Journals: 30, citations > 800

Research Activities in the Coordination Chemistry and Materials Chemistry Laboratory:

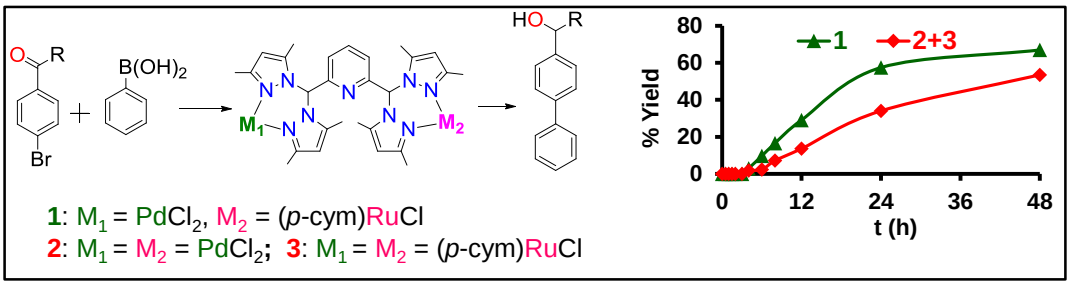
Our research group is primarily focused on two aspects (a) development of embellished transition metal complexes comprising suitable ligand framework and (b) multimetallic core-shell type solid/porous or metal modified nanoparticles, to explore their suitable applications in the area of metal based chemotherapeutic agents and catalysis and sensors.

In this context, our research group is engaged in design and development of suitable ligand frameworks (polypyridyl and polypyrazole) and their corresponding mono-, di- and heterodinuclear complexes of ruthenium, iridium and palladium and platinum. Such complexes are anticipated to exhibit selectivity towards inhibiting various kinases, better anticancer activity with less toxicity and induce **natural product-like non-apoptotic** mode of cell death. Our novel observation suggests that tuning the coordination environment (hydrophobicity) around the metal center, the efficiency and mode of cell death can be controlled. Understanding the metal mediated alteration of cell death mechanism and identifying the controlling parameters associated with this could be useful and promising for the development of efficient anticancer agents for **resistant cancer**.



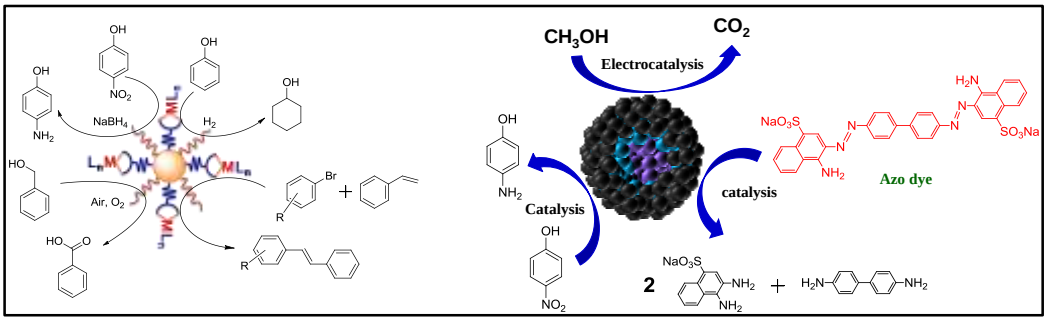
Ref. *Dalton Trans.,* **2013**, *42*, 14081; *Dalton Trans.,* **2014**, *43*, 14546; *Dalton Trans.,* **2015**, *44*, 5114; *Dalton Trans.,* **2016**, *45*, C6DT00929H

The second goal of our research group is the development of efficient **bifunctional catalyst** systems of the combination of Ru-Pd, Ir-Pd and Ir-Ru for various mechanistically diverse one-pot multi-step reactions (**tandem reactions**). Our group is involved in controlling the crucial parameters such as the intermetallic distance, conjugation and cooperative interaction by designing suitable bridging and ancillary ligand frameworks for achieving efficient heterodimetallic complexes with improved reactivity, selectivity and efficiency.



Ref. *Dalton Trans.,* **2014**, *43*, 16597. ACS Catal., 2016, 4, 5535

The third area of our research program is the development of **multimetallic core-shell** type **porous/solid** or **metal modified nanoparticles** to improve the properties and reactivity *via* the cooperative interaction and self-assembly. We are deeply involved in developing multimetallic nanoparticles systems of second and third row transition metals for their use in designing sensors, efficient catalyst systems for organic transformations, electrocatalyst for various electrochemical reactions, waste water treatment, etc.



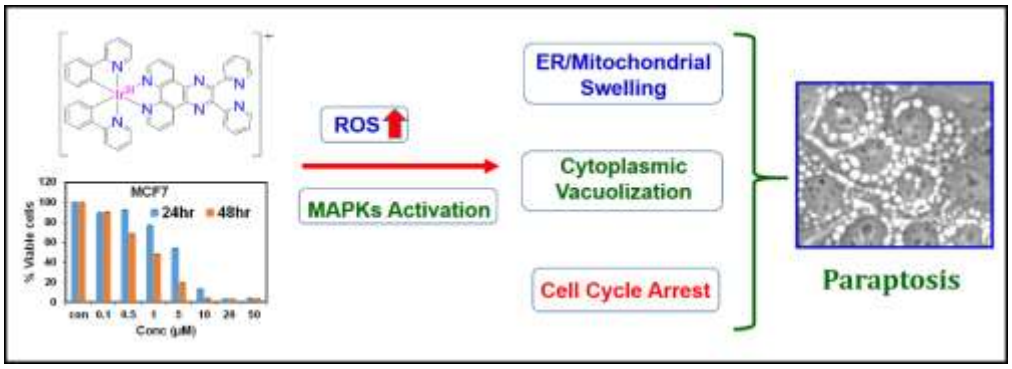
Ref. *J. Mater. Chem. A,* **2015**, 3, 19376.

List of projects:

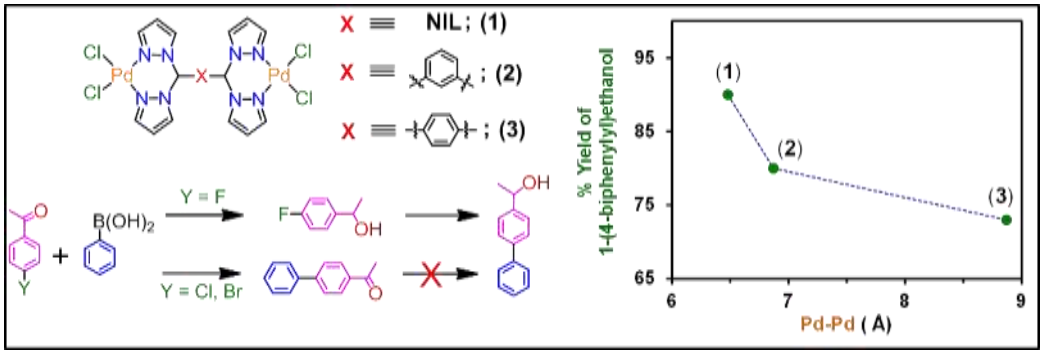
1. **Title of the project:** Designing the Nanoarchitechture Using Metal-Bis-triazine-based Ligands Motif
Funding agency: IIT Bhubaneswar, India.
Status: Completed.
2. **Title of the project:** Development of Metal–Heteroscorpionate Ligands Motif and Their Potential Applications
Funding agency: DST, India.
Status: Completed.
3. **Title of the project:** Development of Transition Metal Functionalized Gold Nanoparticles and Their Potential Applications
Funding agency: CSIR, India.
Status: Completed.
4. **Title of the project:** Design and Development of Heterodimetallic Complexes of Ruthenium, Iridium and Palladium and Their Chemical and Biological Aspects
Funding agency: DST, India.
Status: Continuing.

Publications list

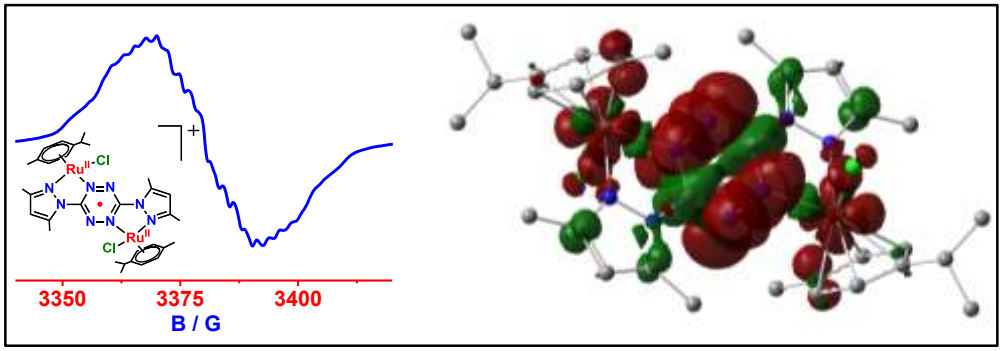
31. Cyclometallated iridium complexes inducing natural product like paraptotic cell death: Synthesis, structure and mechanistic aspects
Suman Kumar Tripathy, Umasankar De, Niranjan Dehury, Paltan Laha, Manas Kumar Panda, Hyung Sik Kim, and **Srikanta Patra**



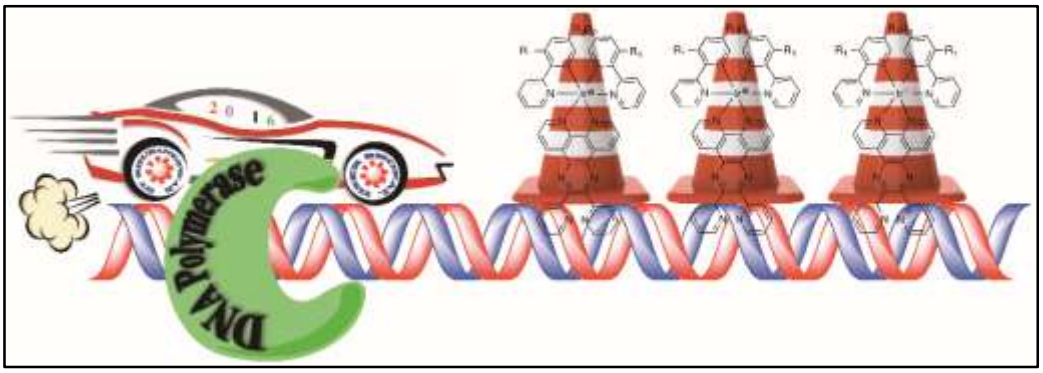
30. Dinuclear Tetrapyrazolyl Palladium Complexes Exhibiting Facile Tandem Transfer Hydrogenation/Suzuki Coupling Reaction of Fluoroarylketone
Niranjan Dehury, Niladri Maity, Suman Kumar Tripathy, Jean-Marie Basset and **Srikanta Patra**
***ACS Catalysis* 2016,** 6, 5535



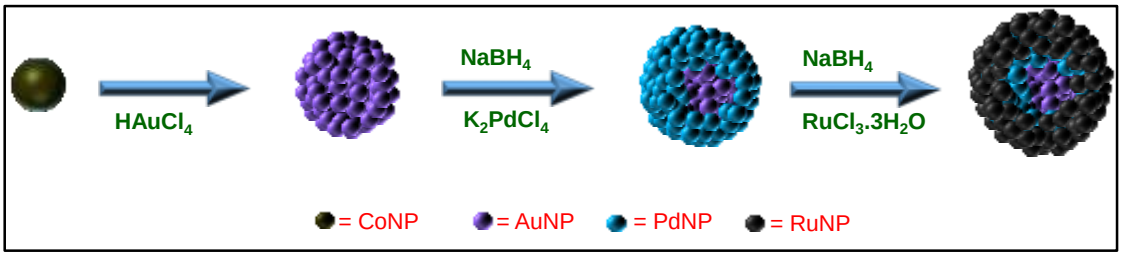
29. Dinuclear $[\{(p\text{-cym})Ru^{II}Cl\}_2(\mu\text{-bpytz}^{\bullet-})]^+$ complex bridged by a radical anion: synthesis, spectroelectrochemical, EPR and theoretical investigation (bpytz = 3,6-bis(3,5-dimethylpyrazolyl)1,2,4,5-tetrazine; p-cym = p-cymene)
Suman Kumar Tripathy, Margarethe van der Meer, Anupam Sahoo, Paltan Laha, Niranjan Dehury, Sebastian Plebst, Biprajit Sarkar, Kousik Samanta, and **Srikanta Patra**
***Dalton Trans*. 2016**, 45, 12532



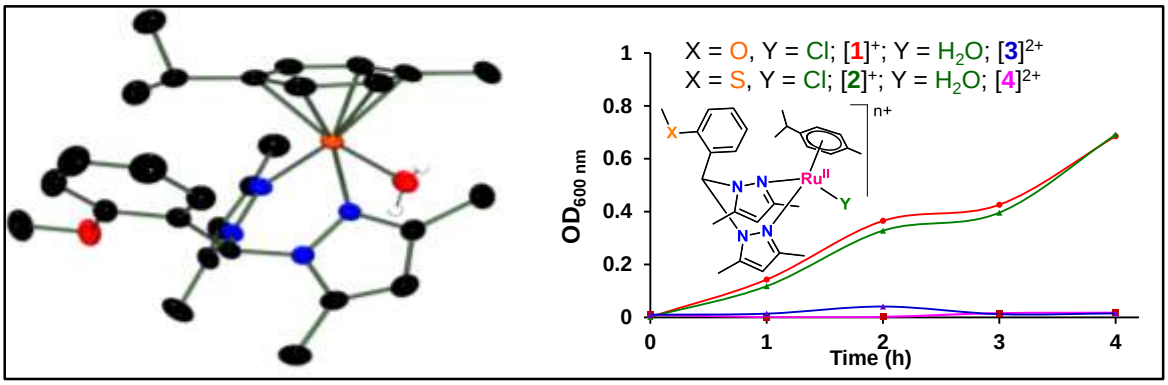
28. Iridium Complexes as a Roadblock for DNA Polymerase During Amplification
Falguni Chandra, Prashant Kumar, Suman Kumar Tripathi, **Srikanta Patra** and Apurba L. Koner
***ChemMedChem*.** 2016, 11, 1410.



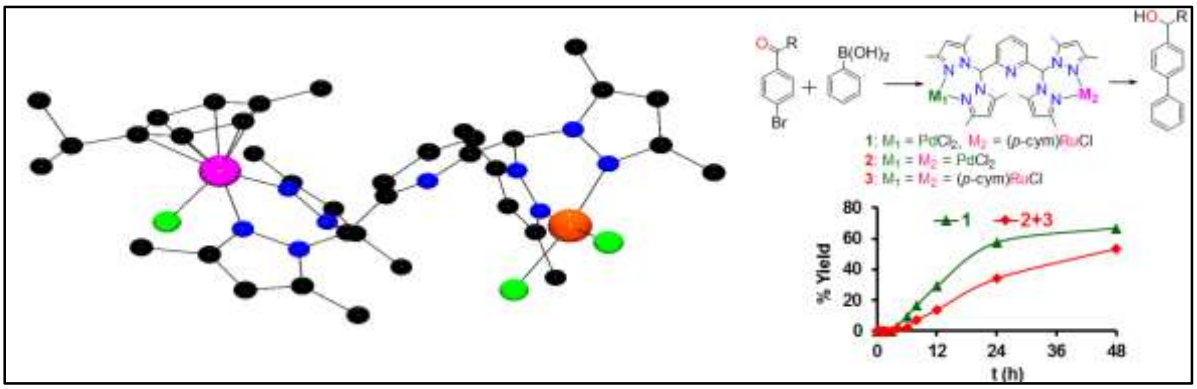
27. Porous trimetallic Au@Pd@Ru nanoparticle system: Synthesis, characterisation and efficient dye degradation and removal
Anupam Sahoo, Suman Kumar Tripathy, Niranjan Dehury, and **Srikanta Patra**
***J. Mater. Chem. A* 2015**, 3, 19376.



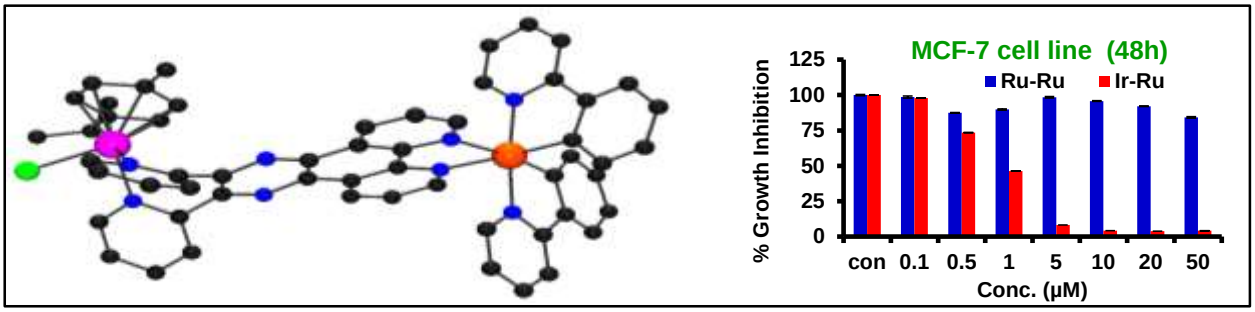
26. Synthesis, characterisation and antibacterial activity of $[(p\text{-cym})RuX(L)]^{+/2+}$ (X = Cl, H_2O; L = bpmo, bpms) complexes
Suman Kumar Tripathy, Ashoka Chary Taviti, Niranjan Dehury, Anupam Sahoo, Satyanaryan Pal, Tushar Kant Beuria and **Srikanta Patra**
***Dalton Trans.*, 2015**, 44, 5514.



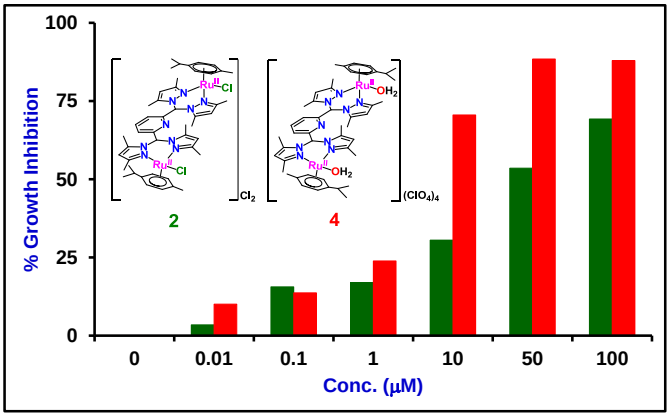
25. Facile tandem Suzuki coupling/transfer hydrogenation reaction with a bis-heteroscorpionate Pd–Ru complex
Niranjan Dehury, Suman Kumar Tripathy, Anupam Sahoo, Niladri Maity and **Srikanta Patra**
***Dalton Trans.*, 2014**, 43, 16597.



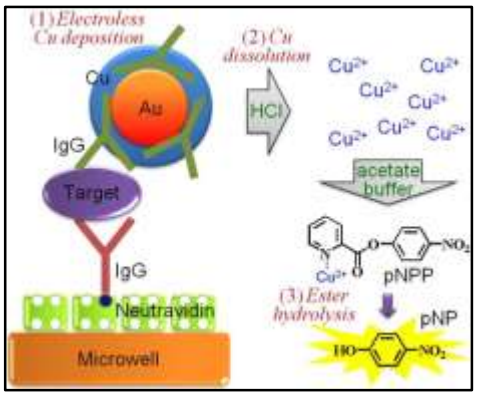
24. Dinuclear $[\{(p\text{-cym})RuCl\}_2(\mu\text{-phpy})](PF_6)_2$ and heterodinuclear $[(ppy)_2Ir(\mu\text{-phpy})Ru(p\text{-cym})Cl](PF_6)_2$ complexes: synthesis, structure and anticancer activity
Suman Kumar Tripathy, Umasankar De, Niranjan Dehury, Satyanarayan Pal, Hyung Sik Kim and **Srikanta Patra**
***Dalton Trans.*, 2014**, 43, 14546.



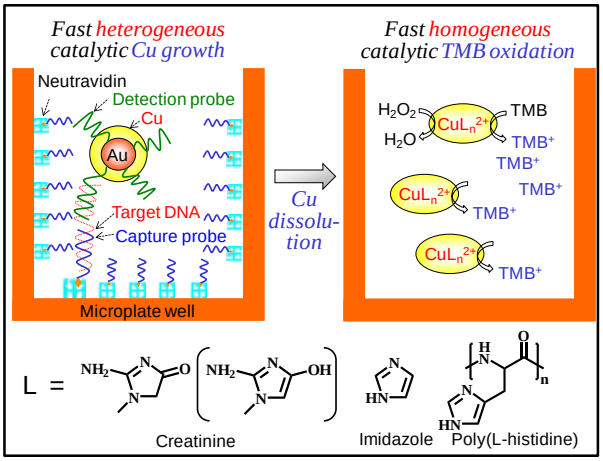
23. Synthesis, characterisation and biological activities of $[(p\text{-cym})RuX(pz_4lut)]^{n+}$ and $[\{(p\text{-cym})RuX\}_2(\mu\text{-}pz_4lut)]^{n+}$ (X = Cl, H_2O and pz_4lut = α,α,α',α'-tetra(pyrazol-1-yl)- 2,6-lutidine)
Suman Kumar Tripathy, Raj Kiran Surada, Rajesh K. Manne, Shaikh M. Mobin, Manas Kumar Santra and **Srikanta Patra**
***Dalton Trans.*, 2013**, 42, 14081.



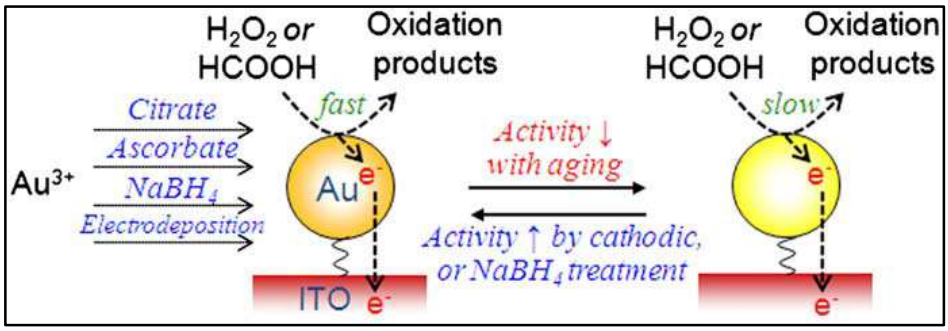
22. An artificial enzyme-based assay: DNA detection using a peroxidase-like Copper–creatinine complex
Amardeep Singh, **Srikanta Patra**, Md. Rajibul Akanda, Haesik Yang
***Sensors and Actuators*, 2012**, 171, 866.



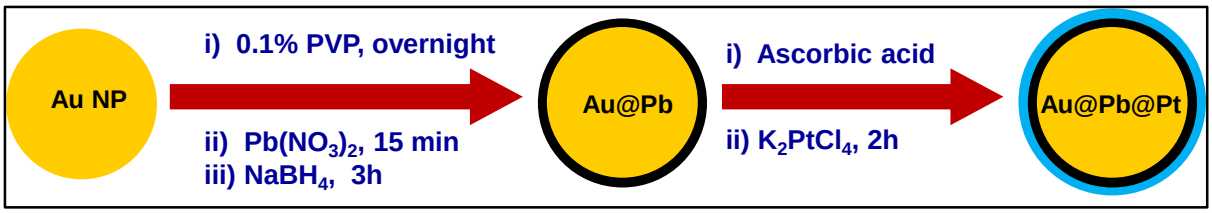
21. An artificial enzyme-based assay: DNA detection using a peroxidase-like copper creatinine complex
Amardeep Singh, **Srikanta Patra**, Jeong-Ah Lee, Kang Hyun Park, Haesik Yang
***Biosens. Bioelectron*., 2011**, 26, 4798



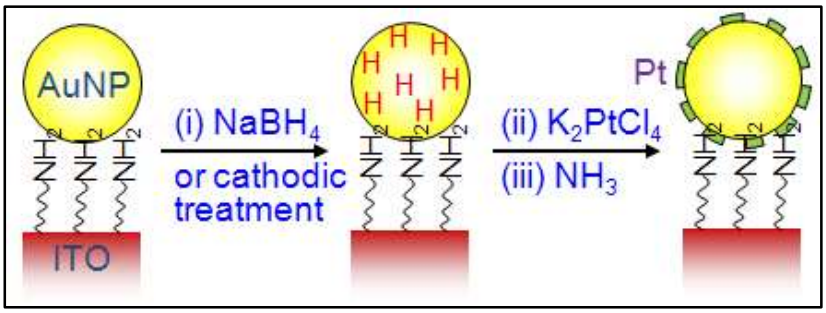
20. Effect of aging on the electrocatalytic activity of gold nanoparticles
Hyun Ju Kang, **Srikanta Patra**, Jagotamoy Das, Abdul Aziz, Jinkyung Jo, Haesik Yang
***Electrochem. Commun*., 2010**, 12, 1245.



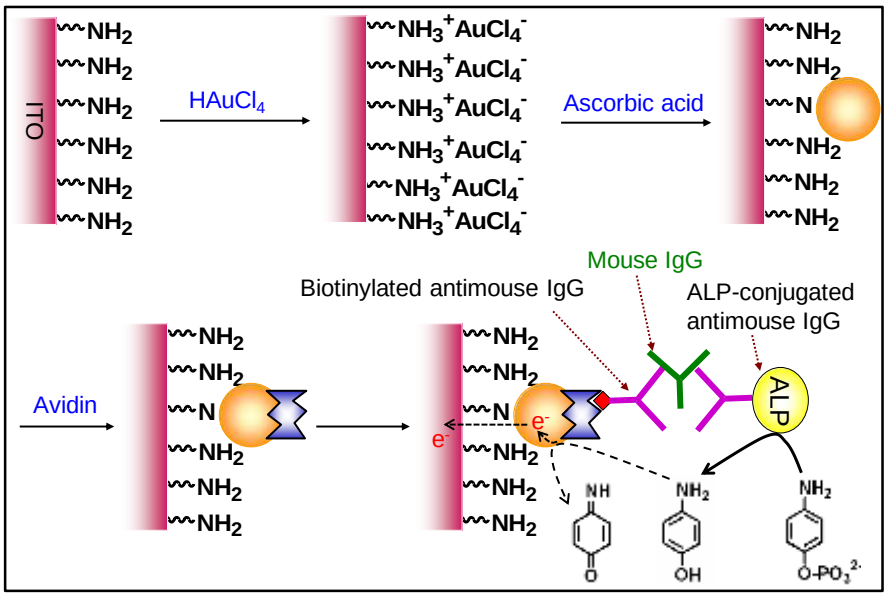
19. Synthesis of Trimetallic Au@Pb@Pt Core-shell Nanoparticles and Their Electrocatalytic Activity for Formic Acid Electrooxidation
Srikanta Patra and Haesik Yang
***Bull. Kor. Chem. Soc*., 2009**, *30*, 1485.



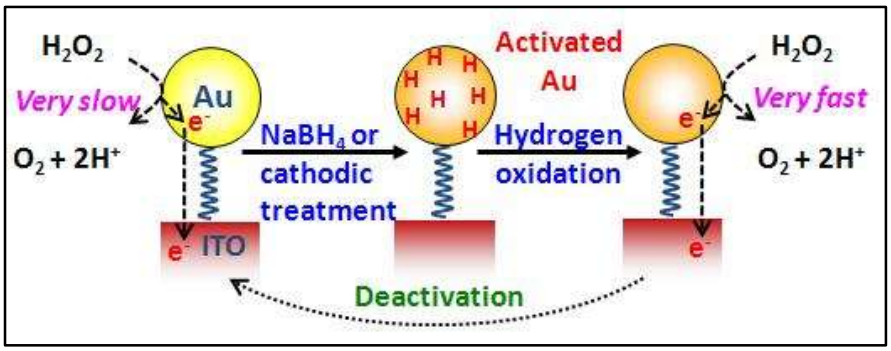
18. Selective Deposition of Pt on Au Nanoparticles Using Hydrogen Presorbed into Au Nanoparticles During $NaBH_4$ Treatment
Srikanta Patra, Jagotamoy Das and Haesik Yang
***Electrochim. Acta*, 2009**, *54,* 3441.



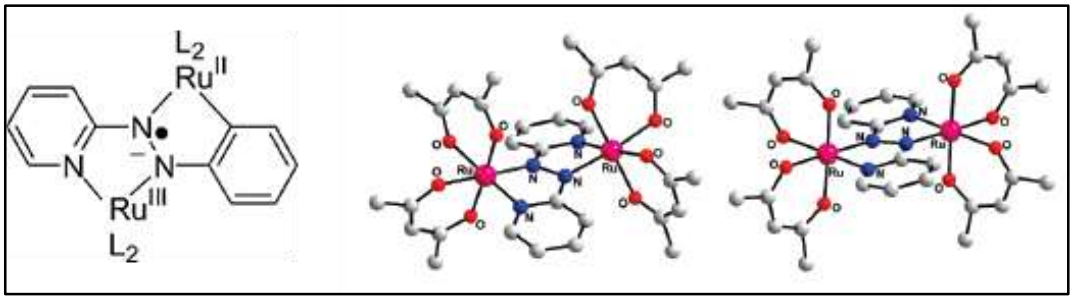
17. Facile Preparation of Low Surface Coverage of Au Nanoparticles on an Indium Tin Oxide Electrode and its Application to Sensitive Protein Detection
Md. Abdul Aziz, **Srikanta Patra** and Haesik Yang
***Chem. Commun.*, 2008,** 4607.



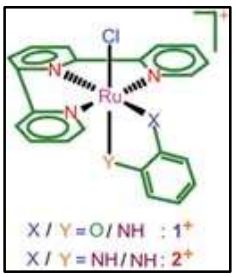
16. Enhancement of the Electrocatalytic Activity of Gold Nanoparticles via $NaBH_4$ Treatment
Jagotamoy Das, **Srikanta Patra** and Haesik Yang
***Chem. Commun.*, 2008,** 4451.



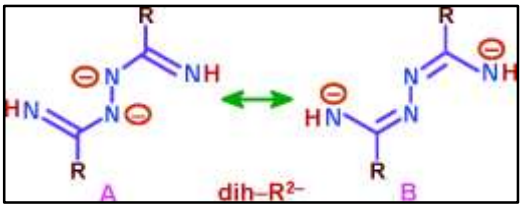
15. Mixed–Valent Metals Bridged by a Radical Ligand: Fact or Fiction Based on Structure-Oxidation State Correlations
Biprajit Sarkar, **Srikanta Patra**, Jan Fiedler, Raghavan B. Sunoj, Deepa Janardanan, Goutam Kumar Lahiri, Wolfgang Kaim
J. Am. Chem. Soc., **2008,** *130*, 3532.



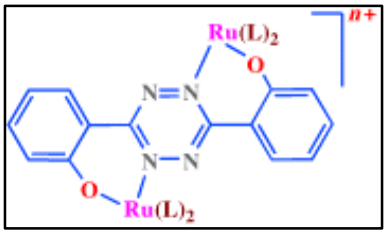
14. Metal Ligand Valence State Distribution in Ruthenium *o*-Quinonoid Systems $[Ru(trpy)(Cl)(L_1)]^+$ [**1**]$^+$ and $[Ru(trpy)(Cl)(L_2)]^+$ [**2**]$^+$ where L_1 = *o*–Iminobenzoquinone, L_2 = *o*–Diiminobenzoquinone and trpy = 2,2/:6/,2// Terpyridine
Somnath Maji, **Srikanta Patra**, Saumen Chakraborty, Deepa Janardanan, Shaikh M. Mobin, Raghavan B. Sunoj and Goutam Kumar Lahiri
Eur. J. Inorg. Chem., **2007**, 314.



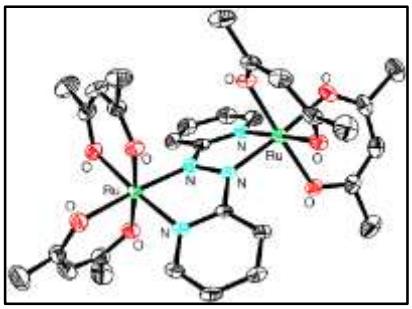
13. Metal-Induced Reductive Ring Opening of 1,2,4,5–Tetrazines: Three Resulting Coordination Alternatives, Including the New Non-Innocent 1, 2-Diiminohydrazido (2–) Bridging Ligand System
Somnath Maji, Biprajit Sarkar, **Srikanta Patra**, Jan Fiedler, Shaikh M. Mobin, Vedavati G. Puranik, Wolfgang Kaim and Goutam Kumar Lahiri
Inorg. Chem., **2006**, *45*, 1316.



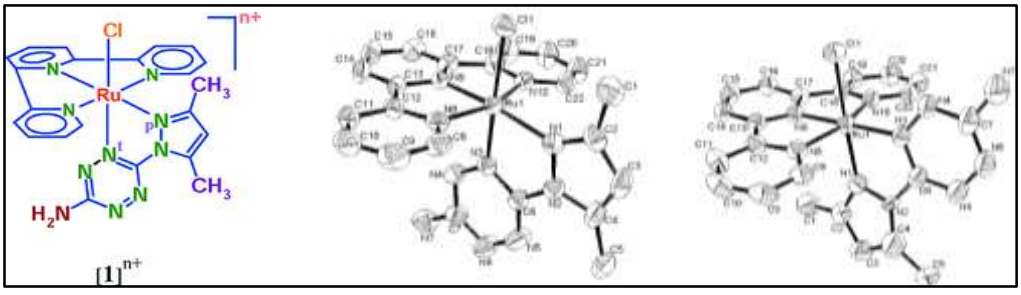
12. Controlling Metal/Ligand/Metal Oxidation State Combinations by Ancillary Ligand (L) Variation in the Redox Systems $[L_2Ru(\mu\text{–boptz})RuL_2]^n$, $boptz^{2-}$ = 3,6–bis(2–oxidophenyl) –1,2,4,5–tetrazine and L= $acac^-$, bpy or pap (2–phenylazopyridine)
Srikanta Patra, Biprajit Sarkar, Somnath Maji, Jan Fiedler, Francisco A. Urbanos, Reyes Jimenez-Aparicio, Wolfgang Kaim, and Goutam Kumar Lahiri
Chem. Eur. J., **2006**, *12*, 489.



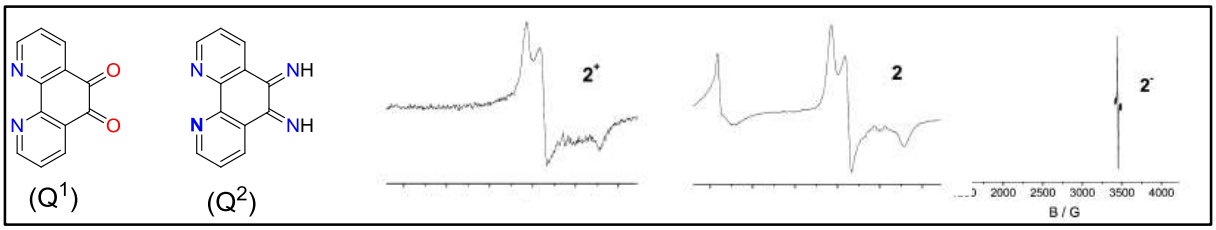
11. Theoretical and Experimental Evidence for a New Kind of Spin-Coupled Singlet Species: Isomeric Mixed–Valent Complexes Bridged by an Anion Radical Ligand
Biprajit Sarkar, **Srikanta Patra**, Jan Fiedler, Raghavan B**.** Sunoj, Deepa Janardanan, Shaikh M. Mobin, Mark Niemeyer, Goutam Kumar Lahiri, and Wolfgang Kaim
Angew. Chem. Int. Ed., **2005**, *44*, 5655.



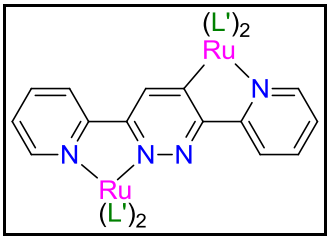
10. Isomeric ruthenium terpyridine complexes $[Ru(trpy)(L)Cl]^{n+}$ containing the unsymmetrically bidentate acceptor L = 3–amino–6–(3,5–dimethylpyrazol–1–yl) –1,2, 4,5–tetrazine. Synthesis, structures, electrochemistry, spectroscopy and DFT calculations
Srikanta Patra, Biprajit Sarkar, Sandeep Ghumaan, Mahendra P. Patil, Shaikh M. Mobin, Raghavan B. Sunoj, Wolfgang Kaim and Goutam Kumar Lahiri
Dalton Trans., **2005**, 1188.



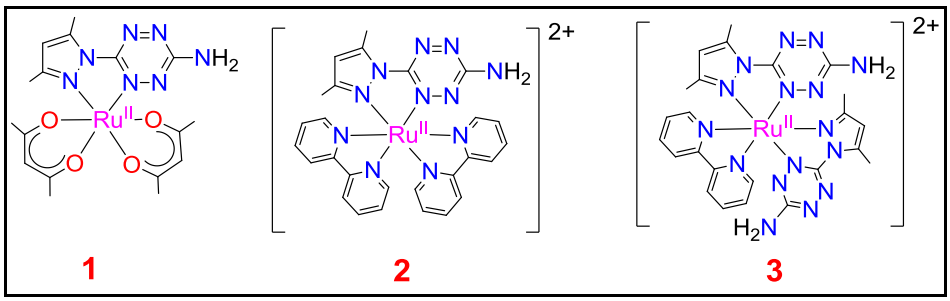
9. Sensitive Oxidation State Ambivalence in the Asymmetric Three–Center (M/Q/M') Systems $[(acac)_2Ru(\mu\text{–}Q)Ru(acac)_2]^n$, Q = 1,10–Phenanthroline-5,6–dione or 1,10–Phenanthroline –5,6–diimine; n = +, 0, –, 2–
Sandeep Ghumaan, Biprajit Sarkar, **Srikanta Patra**, Jan Fiedler, Joris van Slageren, Wolfgang Kaim and Goutam Kumar Lahiri
Inorg. Chem., **2005**, *44*, 3210.



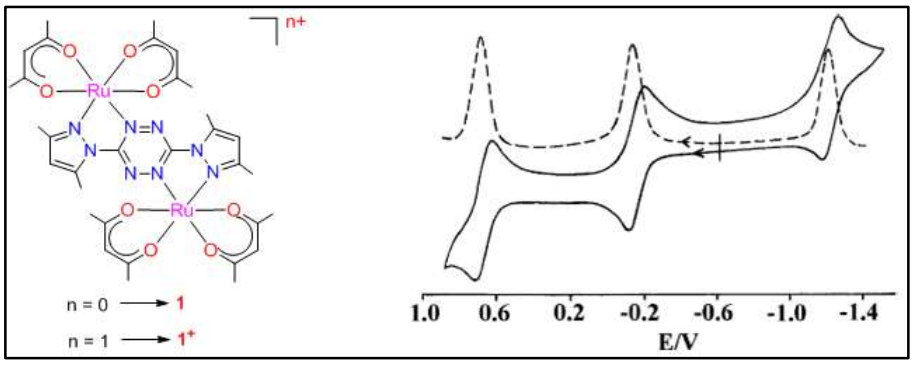
8. 3,6-Bis(2/–Pridyl)Pridazine (L) and its Deprotonated form $(L\text{–}H^+)^-$ as Ligands for $\{(acac)_2Ru^{n+}\}$ or $\{(bpy)_2Ru^{m+}\}$: Investigation of Mixed–Valency in $[\{(acac)_2Ru\}_2(\mu\text{–}L^-H^+)^-]^+$ and $[\{(bpy)_2Ru\}_2(\mu\text{–}L^-H^+)^-]^{3+}$ by Spectroelectrochemistry and EPR
Sandeep Ghumaan, Biprajit Sarkar, **Srikanta Patra**, Kumar Parimal, Joris van Slageren, Jan Fiedler, Wolfgang Kaim and Goutam Kumar Lahiri
Dalton Trans., **2005**, 706.



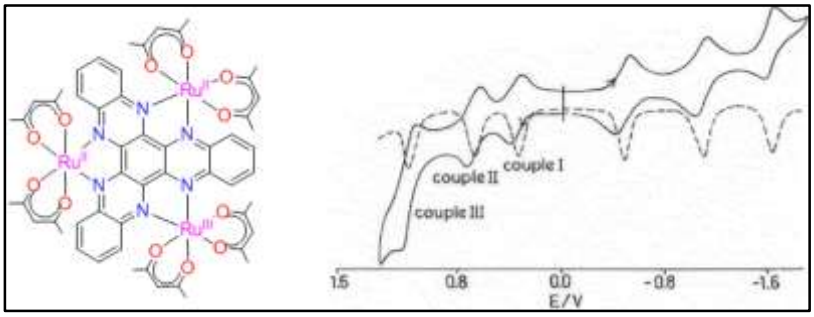
7. Tetrazine Derived Mononuclear $Ru^{II}(acac)_2(L)$ (**1**), $[Ru^{II}(bpy)_2(L)](ClO_4)_2$ (**2**) and $[Ru^{II}(bpy)\ (L)_2](ClO_4)_2$ (**3**) (L=3–Amino–6-(3,5–Dimethylpyrazol–1–yl)–1,2,4,5 –Tetrazine, acac = Acetylacetonate, bpy = 2,2/–Bipyridine). Syntheses, Structures, Spectral and Redox Properties
Animesh Nayak, **Srikanta Patra**, Biprajit Sarkar, Sandeep Ghumaan, Vedavati G. Puranik, Wolfgang Kaim and Goutam Kumar Lahiri
Polyhedron, **2005**, *24*, 333.



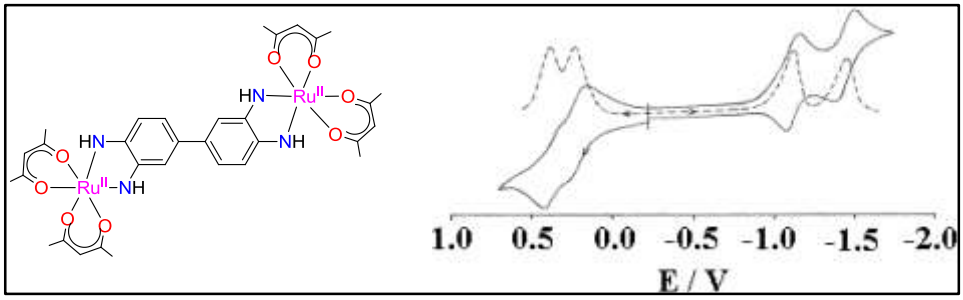
6. Isovalent and Mixed–Vlent Diruthenium Complexes $[(acac)_2Ru^{II}(\mu\text{–}bpytz)Ru^{II}(acac)_2]$ and $[(acac)_2Ru^{II}(\mu\text{–}bpytz)\ Ru^{III}(acac)_2](ClO_4)$ (acac = Acetylacetonate and bpytz = 3,6–bis(3,5–Dimethylpyrazolyl)–1,2,4,5–Ttrazine). Synthesis, Spectroelectrochemical and EPR Investigation
Srikanta Patra, Biprajit Sarkar, Sandeep Ghumaan, Jan Fiedler, Wolfgang Kaim and Goutam Kumar Lahiri
Inorg. Chem., **2004**, *43*, 6108.



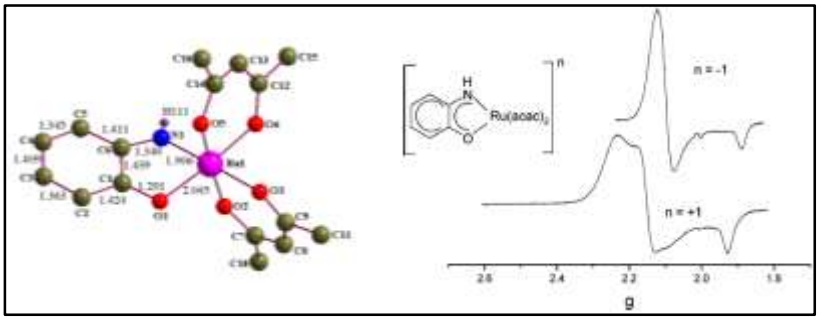
5. The Triruthenium Complex [{(acac)$_2$Ru^{II}}$_3$(L)] Containing a Conjugated Diquinoxaline [2,3–a:2′,3′–c] Phenazine (L) Bridge and Acetylacetonate (acac) as Ancillary Ligands. Synthesis, Spectroelectrochemical and EPR Investigation
Srikanta Patra, Biprajit Sarkar, Sandeep Ghumaan, Jan Fiedler, Wolfgang Kaim and Goutam Kumar Lahiri
Dalton Trans., **2004**, 754.



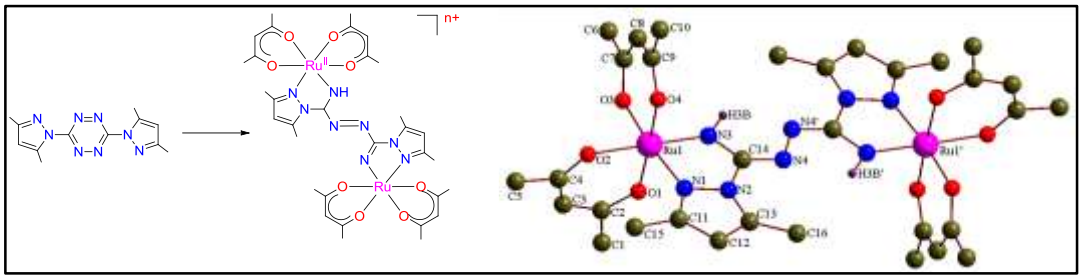
4. {(μ–L)[Ru^{II}(acac)$_2$]$_2$}^{n}, n= 2+, +, 0, –, 2–, with L = 3,3′,4,4′–tetraimino-3,3′,4,4′–tetrahydrobiphenyl. EPR-supported assignment of NIR absorptions for the paramagnetic intermediates
Srikanta Patra, Biprajit Sarkar, Sandeep Ghumaan, Jan Fiedler, Wolfgang Kaim and Goutam Kumar Lahiri
Dalton Trans., **2004**, 750.



3. Separating Innocence and Non–Innocence of Ligands and Metals in Complexes [(L)Ru(acac)$_2$]^n (n = –1, 0,+1; L = *o*–Iminoquinone or *o*–Iminothioquinone)
Srikanta Patra, Biprajit Sarkar, Shaikh M. Mobin, Wolfgang Kaim, and Goutam Kumar Lahiri
Inorg. Chem., **2003**, *42*, 6469.



2. An Unusual Dinuclear Ruthenium(III) Complex with a Conjugated Bridging Ligand Derived from Cleavage of a 1,4–Dihydro–1,2,4,5–Tetrazine Ring. Synthesis, Structure and UV/Vis/NIR Spectroelectrochemical Characterization of a 5–membered Redox Chain Incorporating Two Mixed–Valence States.
Srikanta Patra, Thomas A. Miller, Biprajit Sarkar, Mark Niemeyer, Michael D. Ward, and Goutam Kumar Lahiri
Inorg. Chem., **2003**, *42*, 4707.



1. First Example of μ_3–Sulfido Bridged Mixed-Valent Triruthenium Complex Triangle $Ru^{III}_2Ru^{II}$ (*O, O*–acetylacetonate)$_3$ (μ–*O,O*, γ–*C*-acetylacetonate)$_3$(μ_3–S)(**1**) Incorporating Simultaneous *O, O*– and γ–*C*–Bonded Bridging Acetylacetonate Units. Synthesis, Crystal Structure, Spectral and Redox Properties
Srikanta Patra, Biplab Mondal, Biprajit Sarkar, Mark Niemeyer and Goutam Kumar Lahiri
Inorg. Chem., **2003**, *42*, 1322.