



Publications and Patents

Journal Cover Articles

1. Padhi, S. K.^{*}, et al. **Back Cover:** *Dalton Trans.*, **2026**, 55, 7415–7416.
2. Padhi, S. K.^{*}, et al. **Inside Back Cover:** *Chem. Commun.*, **2026**, 62, 5991–5991.
3. Padhi, S. K.^{*}, et al. **Back Cover:** *Dalton Transactions*, **2025**, 54, 16993–16994.
4. Padhi, S. K.^{*}, et al. **Inside Back Cover:** *Catalysis Science & Technology*, **2025**, 15, 7251.
5. Padhi, S. K.^{*}, et al. **Inside Back Cover:** *Dalton Transactions*, **2025**, 54, 14227.
6. Mishra, A.; Makhal, K.; Raj, D.; Pasupalak, S.; Mallik, B. S.^{*}; Nordlander, E.^{*}; Padhi, S. K.^{*} **Front Cover:** *Hydrogenation of CO₂ to Methanol by a Nickel Pincer Catalyst and Mechanistic Investigations by DFT Studies*, *European Journal of Inorganic Chemistry*, **2025**, 28(21), e70000.
7. Akhter, S. Sk.; Srivastava, D.; Mishra, A.; Patra, N.; Kumar, P.; Padhi, S. K.^{*} **Cover Feature:** *Physicochemical Analysis of Cu(II)-Driven Electrochemical CO₂ Reduction and its Competition with Proton Reduction*, *Chemistry – A European Journal*, **2024**, 30, e202487004.

Publications

1. Raj, D.; Makhal, K.; Mishra, A.; Natarajan, M. T.; Jaiswal, P. K.; Mallik, B. S.; Nordlander, E.; Padhi, S. K.^{*} *Redox Non-Innocent Ligand-Controlled Selective CO₂ Reduction to HCOOH by a Co(II) Catalyst*, *Dalton Trans.*, **2026**, 55, XX–XX. (Accepted; DOI: 10.1039/D6DT01574C)
2. Natarajan, M. T.; Padhi, S. K.^{*} *Hydride-Mediated Ammonia Borane Dehydrogenation in Water by Arene-Ru(II) Catalysts Revealed through Real-Time Gas Evolution*, *Chem. Commun.*, **2026**, 62, 5880–5884. (Inside Back Cover)
3. Natarajan, M. T.; Teja, D.; Akhter, S. Sk.; Bhardwaj, P.; Kumar, P.; Mallik, B. S.; Padhi, S. K.^{*} *Electrocatalytic Ammonia Oxidation Mediated by a Cu(II) Complex: A Hydrazine Pathway to Hydrogen Generation*, *Dalton Trans.*, **2026**, 55, 7111–7126. (Back Cover)

4. Pradhan, A.; Natarajan, M. T.; Rana, R.; Pradhan, T. K.; Padhi, S. K.; Samal, S. L.* *Iodine Incorporated Direct Band Gap Materials for Enhanced Electrochemical Hydrogen Evolution: Role of Structural Distortion and Weak Metal Halide Bond*, **Dalton Trans.**, **2026**, 55(32), 11799–11813. (Front Cover)
5. Chinnasamy, P.; Tamilarasan, S.; Sahoo, M.; Padhi, S. K.; Thangavelu, S.* *Hierarchical Polymorphic Nickel-Tin Sulfides/MWCNT for Permselective Electroreduction of CO₂ to Formate: RRDE-Assisted Product Validation*, **ACS Appl. Energy Mater.**, **2026**, 9(13), 8525–8538.
6. Akhter, S. Sk.; Makhal, K.; Raj, D.; Raj, M.; Natarajan, M. T.; Mallik, B. S.; Bhardwaj, P.; Kumar, P.; Nordlander, E.; Padhi, S. K.* *Selective Electrochemical CO₂ Reduction to CO by a Co(II) Dimer Catalyst by Metal-Ligand Cooperativity*, **Dalton Trans.**, **2025**, 54, 16682–16696.
7. Akhter, S. Sk.; Makhal, K.; Raj, D.; Natarajan, M. T.; Jaiswal, P. K.; Biswas, A.; Mallik, B. S.; Kumar, P.; Padhi, S. K.* *Manoeuvring Organo-electrocatalytic Selective CO₂ Reduction to CO by Terpyridine Derivatives*, **Catal. Sci. Technol.**, **2025**, 15, 7043–7058.
8. Raj, D.; Makhal, K.; Raj, M.; Mishra, A.; Mahapatra, R.; Pattnaik, T.; Mallik, B. S.; Padhi, S. K.* *Electrochemical Water Oxidation using Single-Site Cu(II) Molecular Complexes: A Mechanism Elucidated by Computational Studies*, **Dalton Trans.**, **2025**, 54, 13894–13908. **HOT ARTICLE**
9. Mishra, A.; Makhal, K.; Raj, D.; Pasupalak, S.; Mallik, B. S.*; Nordlander, E.*; Padhi, S. K.* *Hydrogenation of CO₂ to Methanol by a Nickel Pincer Catalyst and Mechanistic Investigations by DFT Studies*, **Eur. J. Inorg. Chem.**, **2025**, 28(21), e202500138.
10. Raj, M.; Padhi, S. K.* *Decoding the Catalytic Potential of Dinuclear 1st-Row Transition Metal Complexes for Proton Reduction and Water Oxidation*, *Chem. Rec.*, **2025**, 25, e202400170. (Invited Article)
11. Mishra, A.; Padhi, S. K.* *Harnessing Ruthenium and Copper Catalysts for Formate Dehydrogenase Reactions*, *Chem. Rec.*, **2024**, 24, e202400172. (Invited Article)
12. Akhter, S. Sk.; Srivastava, D.; Mishra, A.; Patra, N.; Kumar, P.; Padhi, S. K.* *Physicochemical Analysis of Cu(II)-Driven Electrochemical CO₂ Reduction and its Competition with Proton Reduction*, *Chem. Eur. J.*, **2024**, 30, e202403321.

13. Mishra, A.; Srivastav, D.; Raj, D.; Patra, N.; Padhi, S. K.* *Formate Dehydrogenase Activity by a Cu(II)-based Molecular Catalyst and Deciphering the Mechanism by DFT studies, Dalton Trans.,* **2024**, 53, 1209–1220.
14. Maity, N.; Mishra, A.; Mishra, A.; Barman, S.; Padhi, S. K.; Panda, B. B.; Jaseer, E. A.; Javid, M. *Tuning Pd to Ag Ratio to Enhance Synergistic Activity of Fly Ash Supported Pd_xAg_y Bimetallic Nanoparticles, ACS Omega,* **2024**, 9, 1020–1028.
15. Raj, M.; Makhal, K.; Raj, D.; Mishra, A.; Mallik, B. S.; Padhi, S. K.* *Electrocatalytic Hydrogen Evolution by a Dinuclear Copper Complex and Mechanistic Elucidation through DFT Studies, Dalton Trans.,* **2023**, 52, 17797–17809.
16. Raj, M.; Makhal, K.; Mishra, A.; Mallik, B. S.; Padhi, S. K.* *Ligand-mediated Hydrogen Evolution by Co(II) Complexes and Assessment of the Mechanism by Computational Studies, Inorg. Chem.,* **2023**, 62, 10993–11008.
17. Vatsa, A.; Mishra, A.; Padhi, S. K.* *Monitoring of Catalytic Dehydrogenation of Formic Acid by a Ruthenium(II) Complex through Manometry, Inorg. Chem. Commun.,* **2022**, 144, 109898.
18. Vatsa, A.; Padhi, S. K.* *Formic Acid Dehydrogenation by [Ru(η^6 -benzene)(L)Cl] Catalysts: L = 2-methylquinolin-8-olate and quinolin-8-olate, New J. Chem.,* **2022**, 46, 15723–15731.
19. Raj, M.; Padhi, S. K.* *Water Oxidation by a Neoteric Dinuclear Mn(II) Electrocatalyst in Aqueous Medium, Eur. J. Inorg. Chem.,* **2022**, 2022(21), e202200238.
20. Akhter, S. Sk.; Padhi, S. K.* *Electro-catalytic CO₂ Reduction to Syngas and HCOOH by Homogeneous FcNAP2, Eur. J. Inorg. Chem.,* **2022**, 2022(20), e202200206.
21. Raj, M.; Padhi, S. K.* *Electrocatalytic Proton Reduction by Dinuclear Cobalt Complexes in Nonaqueous Electrolyte, New J. Chem.,* **2022**, 46, 6027–6038.
22. Raj, D.; Padhi, S. K.* *The Sporadic μ -Pyridine Bridge in Transition Metal Complexes: A Real Bond or an Interaction?, Coord. Chem. Rev.,* **2022**, 450, 214238.
23. Rai, S.; Akhter, S. Sk.; Padhi, S. K.* *Electrocatalytic Hydrogen Evolution by Molecular Cu(II) Catalysts, Polyhedron,* **2021**, 208, 115425.

24. Vatsa, A.; Padhi, S. K.* *Dehydrogenation of Formic Acid by a Ru(II) Half Sandwich Catalyst, ChemistrySelect*, **2021**, 6(35), 9447–9452.
25. Vatsa, A.; Padhi, S. K.* *Catalytic Water Oxidation by a Ru(II) Half Sandwich Complex, Eur. J. Inorg. Chem.*, **2021**, 2021(34), 3499–3505. (Highlighted in *ChemViews Magazine*)
26. Rai, S.; Padhi, S. K.* *Effectual Electrocatalytic Proton and Water Reduction by Cu(II) Terpyridine Scaffolds, Electrochim. Acta*, **2020**, 364, 137277.
27. Majee, K.; Rai, S.; Panda, B.; Padhi, S. K.* *A Flexible Homoleptic Pentadentate Cu(II) Molecular Catalyst for Effective Proton and Water Reduction, Electrochim. Acta*, **2020**, 354, 136614.
28. Padhi, S. K.*; Ahmad, E.; Rai, S.; Panda, B. *Kinetics and Mechanistic Study of Electrocatalytic Hydrogen Evolution by $[Co(Fc-tpy)_2]^{2+}$, Polyhedron*, **2020**, 187, 114677. (Cover Page)
29. Padhi, S. K.*; Rai, S.; Akhter, S. Sk. *Redox Induced Structural Switching Through Sporadic Pyridine Bridged Co(II)Co(II) Dimer and Electrocatalytic Proton Reduction, Inorg. Chem.*, **2020**, 59, 7810–7821.
30. Padhi, S. K.*; Ahmad, E.; Rai, S. *Kinetics and the Potential Well in Electrochemical Hydrogen Evolution by $[Co(4-tolyl-tpy)_2]^{2+}$, Electrochim. Acta*, **2020**, 340, 136000.
31. Vatsa, A.; Padhi, S. K.* *Catalytic Water Oxidation by a Single Site $[Ru(Fc-tpy)(bpy)(OH_2)]^{2+}$ Complex and its Mechanistic Study, Inorg. Chim. Acta*, **2020**, 504, 119444.
32. Ahmad, E.; Rai, S.; and Padhi, S. K.* *Proton Reduction by a Ni(II) Catalyst and Foot-of-the Wave Analysis for H_2 evolution, Int. J. Hydrog. Energy*, **2019**, 44, 16467–16477.
33. Majee, K.; and Padhi, S. K.* *Ligand Dechelation effect on a $[Co(tpy)_2]^{2+}$ Scaffold towards Electro-catalytic Proton and Water Reduction, New J. Chem.*, **2019**, 43, 3856–3865.
34. Raj, M.; and Padhi, S. K.* *Synthesis, Characterization and Structure of Quinoline based Benzimidazole Derivatives, J. Heterocycl. Chem.*, **2019**, 56, 988–997.

35. Rai, S.; Majee, K.; Raj, M.; Pahari, A.; Patel, J.; and Padhi, S. K.* *Electrocatalytic Proton and Water Reduction by a Co(III) Polypyridyl Complex*, *Polyhedron*, **2019**, 159, 127–134. (Selected for Cover page)
36. Chandra, S.; Majee, K.; Mahto, T. K.; Padhi, S. K.; Sahu, S. K.* *Fabrication of a Hierarchical TiO₂ Microsphere/Carbon Dots Photocatalyst for Oxygen Evolution and Dye Degradation under Visible Light*, *J. Nanosci. Nanotechnol.*, **2018**, 18(2), 1057–1065.
37. Majee, K.; Patel, J.; Das, B.; and Padhi, S. K.* *μ -Pyridine Bridged Copper Complex with Robust Proton Reducing Ability*, *Dalton Trans.*, **2017**, 46, 14869–14879.
38. Ahmad, E.; Majee, K.; Patel, J.; Das, B.; and Padhi, S. K.* *Competent Electro- and Photo-Catalytic Proton Reduction by a [Co(tpy)₂]²⁺ Scaffold*, *Eur. J. Inorg. Chem.*, **2017**, 2017, 3409–3418.
39. Patel, J.; Majee, K.; Raj, M.; Vatsa, A.; Rai, S.; and Padhi, S. K.* *Effect of Quinoline Substitution on Water Oxidation by [Ru(Ql-tpy)(bpy)(OH₂)](PF₆)₂ Catalyst*, *ChemistrySelect*, **2017**, 2, 3053–3059.
40. Patel, J.; Majee, K.; Ahmad, E.; Vatsa, A.; Das, B.; and Padhi, S. K.* *Electronic Effect on Catalytic Water Oxidation by Single Site [Ru(QCl-tpy)(bpy)(OH₂)]²⁺ Catalyst*, *ChemistrySelect*, **2017**, 2, 123–129.
41. Patel, J.; Majee, K.; Ahmad, E.; Das, B.; and Padhi, S. K.* *Effect of Pyridyl Substitution on Chemical and Photochemical Water Oxidation by [Ru(tpy)(bpy)(OH₂)]²⁺ Scaffolds*, *Eur. J. Inorg. Chem.*, **2017**, 2017, 160–171.
42. Majee, K.; Patel, J.; Rai, S.; Das, B.; Panda, B.; and Padhi, S. K.* *Proton Reduction by a Nickel Complex with Internal Quinoline Moiety for Proton Relay*, *Phys. Chem. Chem. Phys.*, **2016**, 18, 21640–21650.
43. Patel, J.; Majee, K.; and Padhi, S. K.* *[Ru^V(NCN-Me)(bpy)(=O)]³⁺ Mediated Efficient Photo-driven Water Oxidation*, *RSC Advances*, **2016**, 6, 61959–61965.
44. Patel, J.; Majee, K.; Ahmad, E.; Tanaka, K.*; and Padhi, S. K.* *[Ru^V(NCN-Me)(bpy)(=O)]³⁺ Mediates Efficient C–H Bond Oxidation from NADH Analogs in Aqueous Media Rather Than Water Oxidation*, *Dalton Trans.*, **2015**, 44(3), 920–923.
45. Padhi, S. K.; Fukuda, R.; Ehara, M.; Tanaka, K. *A Comparative Study of C^N and*

N[^]C Type Cyclometalated Ruthenium Complexes with an NAD⁺/NADH Function, *Inorg. Chem.*, **2012**, 51(15), 8091–8102.

46. Padhi, S. K.; Fukuda, R.; Ehara, M.; Tanaka, K. *Photo-isomerization and Proton-coupled Electron Transfer (PCET) in Mononuclear Cyclometalated Ruthenium Based Water Oxidation Catalysts (WOCs)*, *Inorg. Chem.*, **2012**, 51(9), 5386–5392.
47. Padhi, S. K.; Tanaka, K. *Photo- and Electrochemical Redox Behavior of Cyclometalated Ru(II) Complexes Having 3-Phenylbenzo[b][1,6]naphthyridine Ligand*, *Inorg. Chem.*, **2011**, 50(21), 10718–10723.
48. Padhi, S. K.; Kobayashi, K.; Masuno, S.; Tanaka, K. *Proton-Induced Dynamic Equilibrium Between Cyclometalated Ruthenium rNHC (Remote N-Heterocyclic Carbene) Tautomers with an NAD⁺/NADH Function*, *Inorg. Chem.*, **2011**, 50(12), 5321–5323.
49. Padhi, S. K.; Sahu, R.; Saha, D.; Manivannan, V. *Protonated 4'-(2-pyridyl)-2,2':6',2''-terpyridine and its Fe(II) Bischelates: Syntheses and Molecular Structures*, *Inorg. Chim. Acta*, **2011**, 372, 383–388.
50. Sahu, R.; Padhi, S. K.; Jena, H. S.; Manivannan, V. *Erratum: Conversion of 2-(aminomethyl) Substituted Pyridine and Quinoline to Their Dicarboxyldiimides Using Copper(II) Acetate*, *Inorg. Chim. Acta*, **2011**, 377, 188.
51. Padhi, S. K.; Sahu, R.; Manivannan, V. *Syntheses and Structures of Cobalt(III) Alcoholate Complexes Formed by Addition of a Water Molecule Across 2-pyridyl Substituted Imine Function*, *Inorg. Chim. Acta*, **2011**, 367, 57–63.
52. Sahu, R.; Padhi, S. K.; Jena, H. S.; Manivannan, V. *Conversion of 2-(aminomethyl) Substituted Pyridine and Quinoline to Their Dicarboxyldiimides Using Copper(II) Acetate*, *Inorg. Chim. Acta*, **2010**, 363, 1448–1454.
53. Padhi, S. K.; Sahu, R.; Manivannan, V. *Water-Chloride 2D-Network in 4'-(2-pyridyl)-2,2':6',2''-terpyridine Bis-chelates of M(II) {M = Fe, Ni, Ru}*, *Polyhedron*, **2010**, 29, 709–714.
54. Padhi, S. K.*; Sahu, R. *Co(II/III) Coordinated Pyridine Alcoholate Ligand Generated Through Metal-Assisted Nucleophilic Addition to a C=O Function: Temperature Dependent Synthesis of a Mononuclear Complex and a Neutral Cubane Cluster*, *Polyhedron*, **2008**, 27, 2662–2666.

55. Padhi, S. K.; Sahu, R.; Manivannan, V. *Ni(II) Complexes of 4'-(2-pyridyl)-2,2':6',2''-terpyridine: Structure of Mono- and Bis-chelates Containing Anion $\cdots\pi$ Interactions*, *Polyhedron*, **2008**, 27, 2221–2225.
56. Padhi, S. K.; Saha, D.; Sahu, R.; Subramanian, J.; Manivannan, V. *Synthesis, Structure, Optical and Magnetic Properties of $[CrLX_3]$, $\{L = 4'-(2-pyridyl)-2,2':6',2''-terpyridine; X = Cl^-, N_3^-, NCS^-\}$* , *Polyhedron*, **2008**, 27, 1714–1720.
57. Padhi, S. K.; Sahu, R.; Manivannan, V. *Synthesis, Structure, Thermal Studies on Zn(II), Cd(II) Complexes of N-(2-pyridylmethyl)pyridine-2-carbaldimine and N-(2-pyridylmethyl)pyridine-2-methylketimine*, *Polyhedron*, **2008**, 27, 805–811.
58. Padhi, S. K.; Manivannan, V. *Synthesis, Structural, Spectral and Thermal Investigation of $[ML(NO_3)_2]$: $M = Co, Ni, Cu$; $L = N-(2-pyridylethyl)pyridine-2-methylketimine$* , *Polyhedron*, **2007**, 26, 3092–3096.
59. Padhi, S. K.; Manivannan, V. *Synthesis, Structure and Properties of $[ML(NO_3)_2]$: $M = Co, Ni, Cu$; $L = N-(2-pyridylethyl)pyridine-2-carbaldimine$* , *Polyhedron*, **2007**, 26, 1619–1624.
60. Padhi, S. K.* *Solid-State Kinetics of Thermal Release of Pyridine and Morphological Study of $[Ni(ampy)_2(NO_3)_2]$; $ampy = 2-picolylamine$* , *Thermochim. Acta*, **2006**, 448, 1–6.
61. Padhi, S. K.; Manivannan, V. *$Cu(NO_3)_2 \cdot 3H_2O$ -Mediated Synthesis of 4'-(2-pyridyl)-2,2':6',2''-terpyridine (L2) from N-(2-pyridylmethyl)pyridine-2-methylketimine (L1): A C–C Bond-Forming Reaction and the Structure of $\{[Cu(L2)(OH)(NO_3)][Cu(L2)(NO_3)_2] \cdot 2H_2O\}$* , *Inorg. Chem.*, **2006**, 45, 7994–7996.

Patents

1. Roy, T.; Natarajan, M. T.; Jana, S.; Das, P.; and Padhi, S. K.* *A Fluoro-Bridged Mixed Valence Dinuclear Copper Complex: Synthesis, Characterization, and Use in the Oxidation Reactions*. Indian Patent Application No. 202531111630, Filed: 14 Nov 2025. **(Status: GRANTED)**
2. Mishra, A.; and Padhi, S. K.* *A process for the preparation of methanol by the hydrogenation of bicarbonate and carbon dioxide (CO_2) captured from air*. Indian Patent Application No. 202431048509, Filed on 25th June 2024. **(Status: GRANTED)**

3. Natarajan, T.; and Padhi, S. K.* *A catalyst for green hydrogen generation, a process for the preparation thereof and the use thereof for green hydrogen generation from ammonia.* Indian Patent Application No. 202431070872, Filed on 19th Sept. 2024. **(Status: GRANTED)**
4. Tanaka, K.; Padhi, S. K. *Ruthenium complexes, and their use for preparation of reduced compounds of organic compounds.* *Jpn. Kokai Tokkyo Koho* (2011), JP 2011246412 A, 08 Dec 2011. **(Status: GRANTED)**
5. Mishra, A.; and Padhi, S. K.* *A process for the hydrogenation of carbon dioxide (CO₂) to methanol.* Indian Patent Application No. 202431048508, Filed on 25th June 2024. **(Status: Published)**