



**Centre/School/Special Centre: Physical Sciences**

**Department: Chemistry**

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**Dr. Suryabhan Singh**

**Assistant Professor**

## **Qualifications**

**Ph. D. Chemistry** (2011): Banaras Hindu University

**Supervisor:** Prof. Subrato Bhattacharya

**Title of Thesis:** *Synthesis, structures and properties of thiophene-2-thiocarboxylate and pyridine-2,6-bis(thiocarboxylate) derivatives of some transition and main group metals.*

**M. Sc. Chemistry** (2007): Banaras Hindu University

**B. Sc. (Hons.) Chemistry** (2005): Banaras Hindu University

## **Area of Interest/Specialization: Inorganic Chemistry**

- Mono/bi/polynuclear (Metal Organic Framework) complexes of transition and main group metals.
- Development of crystals and investigation of their solid state structure and weak interactions in particular metal-metal and hydrogen bonding.
- To study their catalytic, gas storage (in case of MOFs), electrical and optoelectronic properties.
- Explore the structural chemistry of metal complexes by Density functional theory calculations by Natural bonding orbital calculations at DFT and *ab-initio* level.
- Applications of Time dependent density functional theory (TDDFT) calculations for metal complexes.

## **Experience**

May            Post-Doctoral Fellow under supervision of **Dr. A. K. Singh**, Department of  
2018/Sept    Chemistry, Indian Institute of Technology Indore, on the topic “**Synthesis**  
2019           **characterization and reactivity of transition metal complexes with multiple**

### **NHC donor ligands”.**

April 2017/April 2018	Post-Doctoral Fellow under supervision of <b>Prof. P. Mathur</b> , Department of Chemistry, Indian Institute of Technology Indore, on the topic “ <b>Designing polynuclear 3d and 4f metal clusters bearing bridging chalcogenides for applications of as single molecule magnets</b> ”.
Nov. 2013/Nov. 2016	Dr. D. S. Kothari Post-Doctoral Fellow under supervision of <b>Prof. S. Natarajan</b> , SSCU, Indian Institute of Science, Bangalore on the topic “ <b>Development of new metal-organic frameworks (MOFs) for catalytic and gas storage (H<sub>2</sub>, CO<sub>2</sub>, CH<sub>4</sub>) applications</b> ”.
July 2010/May 2013	Senior Research Fellow under the supervision of <b>Prof. S. Bhattacharya</b> , Department of Chemistry, BHU on the topic “ <b>Synthesis, structures and properties of thiophene-2-thiocarboxylate and pyridine-2,6-bis(thiocarboxylate) derivatives of transition and main group metals</b> ”.
July 2008/June 2010	Junior Research Fellow under the supervision of <b>Prof. S. Bhattacharya</b> , Department of Chemistry, BHU on the topic “ <b>Synthesis, structures and properties of thiophene-2-thiocarboxylate and pyridine-2,6-bis(thiocarboxylate) derivatives of transition and main group metals</b> ”.
March 2008/June 2008	Junior Research Fellow under the supervision of <b>Prof. S. Bhattacharya</b> , Department of Chemistry, BHU on the topic “ <b>Studies of synthesis, characterization and reactivity of organobimetallic complexes containing sulfide and disulfide ligands</b> ” (CSIR Project).

### **Awards and Honors**

- Post-Doctoral Fellowship by IIT Indore, India, April, 2017
- Dr. D. S. Kothari Post-Doctoral Fellowship by UGC, India, 2013
- Senior Research Fellowship by CSIR, India, 2010
- Junior Research Fellowship (NET-JRF) by CSIR, India, 2007

## Research Projects

S. N.	Name of grant	Funding Agency	Year	Amount (Rs)	Duration
1.	UGC – Startup Grant	UGC, New Delhi	June 2020	10,00000/-	Two years

**International Collaboration/Consultancy:** No

## List of Publications (All)

1. Lanthanum-based double perovskite oxides as cobalt-free catalyst for bifunctional application in electrocatalytic oxygen reactions. D. P. Singh, S. Mukherjee, S. Bhagat, N. Singh, M. Singh, A. K. Singh, A. K. Singh\*, U. P. Azad \*, **Suryabhan Singh\***, Lalrintluangi, and V. P. Singh, *Int. J. Hydrogen Energy*, 51, 587-600, **2024**.
2. The Applications of 2D Materials for Electrochemical Biosensing, Drug Delivery, and Environmental Monitoring. N. Singh, D. Gupta, U. P. Azad\*, A. K. Singh1\*, S. K. Singh\*, **Suryabhan Singh\*** and D. P. Singh, *Curr. Top. Med. Chem.*, 23, 1426 – 1447, **2023**.
3. Organophosphate insecticides: environmental impacts and chemical properties – a comprehensive review. D. Gupta, C. Singh P. K. Nayak, **Suryabhan Singh\*** and S. K. Singh, *C. J. Sci. Technol.*, 19, 292-299, **2022**.
4. Co-operative influence of co-crystallized solvent in sustaining supramolecular architectures of Zn(II)/Cd(II) homoleptic pyridyl functionalized dithiocarbamates complexes via non-covalent interactions. V. Kumar and **Suryabhan Singh**, *J. Sulfur Chem.*, 43, 252-263, **2022**.
5. Cationic ruthenium(II)-NHC pincer complexes with hemilabile COD: Solid-state structural characterization and theoretical study of an  $\eta^2$ -(E,Z)-COD ligand. D. Yadav, R. K. Singh, **Suryabhan Singh**, P. M. Shirage, A. K. Singh, *J. Organomet. Chem.* 953, 122061, **2021**.
6. Synthesis, Crystal Structure, and Properties of Heteroleptic Cu(I) dithiocarbamate complex containing diphenyl phosphinoferrocene (dppf). V. Kumar and **Suryabhan Singh**, *J. Str. Chem.*, 62, 1723-1731, **2021**.

7. Cationic ruthenium(II)–NHC pincer complexes: Synthesis, characterisation and catalytic activity for transfer hydrogenation of ketones. D. Yadav, S. Misra, D. Kumar, **Suryabhan Singh**, A. K. Singh, *Appl. Organomet. Chem.*, 35, e6287, **2021**.
8. Ferrocene decorated unusual mercury(II) dithiocarbamate coordination polymers: crystallographic and computational studies. A. Singh, A. Singh, **Suryabhan Singh**, G. Kociok-Köhn, M. Muddassir and A. Kumar, *CrystEngComm*, **23**, 2414–2423, **2021**.
9. Evolution of metal-thiocarboxylate chemistry in 21<sup>st</sup> century. **Suryabhan Singh**, *J. Mol. Str.*, **1234**, 130184, **2021**.
10. New main-group ferrocenyldithiocarbamates and conversion to ferrocene oxazolidine-2-thione and -2-one. R. Yadav, **Suryabhan Singh**, M. Trivedi, G. Kociok-Köhn, N. P. Rath, R. D. Köhn, M. M Muddassir and A. Kumar, *New J. Chem.*, **44**, 3268-3277, **2020**.
11. Silver-Nitrilotriacetate Coordination Polymers: Supra-molecular and Photoluminescence Properties. **Suryabhan Singh**, *Inorg. Chim. Acta*, **495**, 118939, **2019**.
12. Coordination Behaviour of 2-(Methylthio)Pyrazine with Ag(I) in the presence of Different Counter Anions and Emission Properties. **Suryabhan Singh**, **A. Raghuvanshi**, **P. Mathur** and **A. K. Singh**, *Polyhedron*, 169, 8-13, **2019**.
13. Cu(I)/Ag(I)-3-(2-Pyridyl)-5,6-diphenyl-1,2,4-triazine-p,p'-disulfonate Based Coordination Polymers: Synthesis, Structures and Photoluminescent Properties. **Suryabhan Singh**, *ChemistrySelect*, 3, 6786-6790, **2018**.
14. Supramolecular architecture of organotin(IV) N-methyl ferrocenyl N-ethanol dithiocarbamates: crystallographic and computational studies. A. Kumar, A. Singh, R. Yadav, **Suryabhan Singh**, G. Kociok-Köhn and M. Trivedi, *Inorg. Chim. Acta*, 471, 234-243 **2018**.
15. Water linked 3D Coordination Polymers: Syntheses, Structures and Applications. **Suryabhan Singh\*** and Anupam Bhim, *J. Solid State Chem.*, 244, 151-159, **2016**.
16. Hydrogen Energy Future with Formic Acid: A Renewable Chemical Hydrogen Storage System. A. K. Singh, **Suryabhan Singh\*** and A. Kumar, *Catal. Sci. Technol.*, 6, 12-40, **2016**.
17. Structural diversities in Cu(I) and Ag(I) sulfonate coordination polymers and their anion exchange properties. **Suryabhan Singh\*** and R. Karthik, *CrystEngComm*, 17, 7363-7371, **2015**.

18. Synthesis, Crystal Structure and Spectroscopic and Electrochemical Properties of Bridged Trisbenzoato Copper-Zinc Heterobinuclear Complex of 2, 2'-Bipyridin. A. Koch, A. Kumar, **Suryabhan Singh**, R. Borthakur, D. Basumatary and R. A. Lal, *J. Mol. Structure*, 1083, 381-388, **2015**.
19. Phenylmercury(II) methylferrocenyldithiocarbamate functionalized dye-sensitized solar cells with hydroxyl as an anchoring group. R. Chauhan, G. K.-Köhn, M. Trivedi, **Suryabhan Singh**, A. Kumar and D. P. Amalanerkar, *J. Solid State Electrochem.*, 19, 739-747, **2015**.
20. Studies of structural diversity due to inter-/intra-molecular hydrogen bonding and photoluminescent properties in thiocarboxylate Cu(I) and Ag(I) complexes. **Suryabhan Singh\*** and S. Bhattacharya, *RSC Advances*, 4, 49491-49500, **2014**.
21. New ternary compounds containing Zn-Cu and Zn-Ag from single molecular source precursors. **Suryabhan Singh**, J. Chaturvedi and S. Bhattacharya, *RSC Advances*, 4, 11469-11474, **2014**.
22. A Cu(II) mediated new desulfurization pathway involving elimination of ethylene sulfide. N. Sareen, **Suryabhan Singh** and S. Bhattacharya, *Dalton Trans.*, 43, 4635-4638, **2014**.
23. ROS and RNS induced apoptosis through p53 and iNOS mediated pathway by a dibasic hydroxamic acid molecule in leukemia cells. K. Banerjee, A. Ganguly, P. Chakraborty, A. Sarkar, **Suryabhan Singh**, M. Chatterjee, S. Bhattacharya and S. K. Choudhuri, *Eur. J. Phar. Sci.*, 52, 146-164, **2014**.
24. Syntheses and structural studies of heterobimetallic thiocarboxylate complexes containing zinc and silver. **Suryabhan Singh**, J. Chaturvedi, and S. Bhattacharya, *Inorg. Chim. Acta*, 407, 31-36, **2013**.
25. Syntheses and structural studies of heterobimetallic thiocarboxylate complexes containing zinc and copper. **Suryabhan Singh**, J. Chaturvedi, A. S. Aditya, N. R. Reddy and S. Bhattacharya, *Inorg. Chim. Acta*, 396, 6-9, **2013**.
26. Studies of titanocene and zirconocene pyridine-2,6-bis-thiocarboxylates exhibiting partial desulfurization. **Suryabhan Singh** and S. Bhattacharya, *Inorg. Chim. Acta*, 395, 230-236, **2013**.
27. Supramolecular organotin(IV) framework derived from pyridine-2,6-bis(thiocarboxylate) ligand. **Suryabhan Singh** and S. Bhattacharya, *Inorg. Chem. Comm.*, 24, 144-147, **2012**.

28. Solvent dependent crystallization of a few Hg(II) thiocarboxylates. **Suryabhan Singh**, J. Chaturvedi and S. Bhattacharya, *Inorg. Chim. Acta*, 385, 112-118, **2012**.
29. Studies of synthesis, structural features of Cu(I) thiophene-2-thiocarboxylates and unprecedented desulfurization of Cu(II) thiocarboxylate complexes. **Suryabhan Singh**, J. Chaturvedi and S. Bhattacharya, *Dalton Trans.*, 41, 424-431, **2012**.
30. The Chemistry of Cadmium-Thiocarboxylate Derivatives: Synthesis, Structural Features, and Application as Single Source Precursors for Ternary Sulfides. **Suryabhan Singh**, J. Chaturvedi, S. Bhattacharya and H. Nöth, *Inorg. Chem.*, 50, 10056-10069, **2011**.
31. Synthesis of triphenyltin(IV) hydrosulfide. **Suryabhan Singh** and S. Bhattacharya, *Inorg. Chim. Acta*, 367, 230-232, **2011**.
32. Silver(I) catalyzed oxidation of thiocarboxylic acids into the corresponding disulfides and synthesis of some new Ag(I) complexes of thiophene-2- thiocarboxylate. **Suryabhan Singh**, J. Chaturvedi,, S. Bhattacharya and H. Nöth, *Polyhedron*, 30, 93-97, **2011**.
33. N-(Prop-2-yn-1-yl)-1,3-benzothiazol-2-amine. A. Agarwal, M. K. Singh, **Suryabhan Singh**, S. Bhattacharya and S. K. Awasthi, *Acta Cryst.*, E67, 2637-2638, **2011**.
34. Synthesis and Structural Studies of Organotin(IV) and Organolead(IV) Thiophene-2-thiocarboxylate. **Suryabhan Singh**, S. Bhattacharya and Heinrich Nöth, *Eur. J. Inorg. Chem.*, 5691-5699, **2010**.

### **Recent Books/Book Chapters/Monographs etc**

1. Nanomaterials via Single–Source Precursors, Synthesis, Processing and Applications: Single Source Precursors for Main Group Metal Sulfides and Solar Cell Applications. **Suryabhan Singh**, A. K. Singh and A. Kumar, Elsevier, pp. 357-387, **2022**.

### **Research Supervision:** Nil

### **Administrative Responsibilities**

- Assistant Center Superintendent, Chemistry Building 2022-23.
- Criteria I coordinator NAAC, Department of Chemistry GGV.
- Polling Officer, the Students’ Council Election – 2019.
- Member of University Wall Calendar, Table Calendar and Diary Committee 2019-2020.

- Coordinator of Badminton Male in University Interschool Sports Meet-2019-2020.
- Mentor of B.Sc. V Sem.- 2023-24
- Member of UG and PG Admission Committee of the department.
- Member, Various Departmental Committees.
- Member, Organizing conferences/seminars/workshops, GGV.

### **Additional Information**

Total number of Publications: **35** (international), H index: **12**, Conference/Symposium/Workshop: **25**, Reviewer for many international journals such as Dalton Trans., Polyhedron, Inorg. Chim. Acta, J. Mol. Str., ChemSelect, ACS Omega *etc.*