Biodata of Dr. Rajendra Singh Dhayal

1. **Name**: Dr. Rajendra Singh Dhayal
2. **Fathers Name**: Mr. Bhola Ram Dhayal
3. **Specialization**: Inorganic Chemistry and Nanocluster Chemistry

Current address for Correspondence

Professor,
School of Chemical Sciences and Pharmacy,
Department of Chemistry,
Central University of Rajasthan, Ajmer
E-mail: rajendra.dhayal@curaj.ac.in or rajendra.dhayal@gmail.com

Permanent address

Dr. Rajendra Singh Dhayal S/o Mr. Bhola Ram Dhayal, Village. Kotari Dhayalan (Pintawali Dhani), Via – Ringus, Dist. Sikar (Raj.) PIN 332404. E-mail: **rajendra.dhayal@gmail.com**

GATE-JRF (Jan., 2005 – Dec., 2006):
Central Salt and Marine Chemical Research Institute (CSIR-Lab), Bhavnagar, Gujarat.

Doctoral Research (January, 2007 to June 2011)
PhD Thesis Title: "Chalcogen Stabilized Metallaboranes of Group 6 Transition Metals."
Supervisor: Prof. Sundargopal Ghosh, Department of Chemistry, IIT Madras.

Postdoctoral Research Fellow (Aug., 2011 – Dec., 2014): National Dong Hwa University, Hualien, Taiwan.
Advisor: Prof. Chen-Wei Liu, (Distinguished), Head of Department of Chemistry, NDHU, Taiwan.
Assistant Professor (January 2015 to 10th July 2015), Thapar University (A Deemed University), Patiala, Punjab
Assistant Professor (13th July 2015 to 25th July 2015), L-10, Central University of Punjab, Bathinda, Punjab
Assistant Professor (26th July 2015 to 25th August 2020), L-11, Central University of Punjab, Bathinda, Punjab
Assistant Professor (26th August 2020 to 25th August 2023), L-12, Central University of Punjab, Bathinda, Punjab
Associate Professor (26th August 2023 to 10th march 2026), L-13A, Central University of Punjab, Bathinda, Punjab
Professor (11th March 2026 to continued), L-14, Central University of Rajasthan, Ajmer, India

HONORS/AWARDS

- Best Faculty teaching award (2016) by Central university of Punjab
- Best Faculty research award (2016) by Central University of Punjab
- NSC Post-Doctoral Fellowship (July 2011- Now), NDHU, Taiwan.
- Senior Research Fellowship (UGC-SRF), (2011)
- Junior Research Fellowship (UGC-JRF), (2008)
- CSIR-NET (2007)
- CSIR-NET (2006)
- CSIR-NET (2005)
- GATE - 2006, Score = 376, AIR = 381 (92 Percentile)
- GATE – 2005, Score = 341, AIR = 416 (90 Percentile)
- Qualified DRDO-SET 2008

EXPOSURE TO:

- NMR analysis (^{1}H, ^{2}H, ^{11}B, ^{77}Se, ^{13}C, ^{31}P, ^{109}Ag)
- X-ray analysis
- GC-MS analysis, ESI-MS analysis
- Spectroscopic data interpretation (CHN, IR, Uv-vis., CD, TGA, SEM, EDS, XPS etc.,)
- Capable to work on Ortep, Mecury, Diamond, Topspin, SciFinder Search, etc.

Research interest:

- Metal hydrides and their applications (like Solar H_2 evolution, CO_2 reduction, Hydrogenation of unsaturated hydrocarbons).
- Super atom Chemistry (Atomic precise structure of Nanomaterial)
- Chalcogen stabilized metal complexes and their applications in solar cells.
- Organometallic chemistry (synthesis and characterization of metallaborane, Metallaheteroboranes)
- Hydrogenation and hydroformylation

Book Chapter: ISBN:1-58883-263-5

Title: One-Dimensional Copper Chalcogenides (S/Se) and Cu Nanomaterials from Single Molecule Precursors, Rajendra Singh Dhayal, C. W. Liu. Page 247-271, Year 2019, Publisher, American Scientific Publisher, USA, Edited by Ramesh S. Chaughule and Rupesh S. Devan.

List of Publications

S. No.	Author(s)	Title of Paper	Name of the Journal, year, volume, page numbers	Impact Factor	ISSN: Number

40	Dilip K. Jangid, A. Prakash, S. K. Bose, Rajendra S. Dhayal	Atomically Precise [Cu-Cu_{54}] Nanocluster-Catalyzed Three-Component Borylative Coupling of Alkynes with Alkyl Bromides and Chlorides	*Angew. Chem. Int. Ed.* ***2026****, 65, e23716* https://doi.org/10.1002/anie.202523716	17 (160\)	1433-7851
39	D. K. Jangid, P. Kumari, S. K. Bose, K. K. Haldar, K. Mondal, Rajendra S. Dhayal	Ferrocenyl Dithiophosphonate Stabilized Heterobimetallic (CoII/FeII, NiII/FeII, and CuI/FeII) Complexes: Synthesis, Characterization, Luminescence, and Electrochemical Behavior	*Inorg. Chem.* **2026**, 65, 4, 2599–2613	5.436	0020-1669
38	Prakash, A.; Basappa, S.; Jangid, D. K.; Dhayal, R. S.; Bose, S.	Synthesis of Cu(0) Catalyst for Borylation of Alkyl Halides and Hydroboration of Alkenes: Scalable Access to Alkyl Boronate Esters	Inorg. Chem. **2025**, 64, 31, 15951–15960	5.436	0020-1669
37	A. Prakash, S. Basappa, R. R. Urkude, R. Jangir, **R. S. Dhayal**, S. K. Bose	Zero-Valent Copper Catalysis Enables Regio- and Stereoselective Difunctionalization of Alkynes	*Angew. Chem. Int. Ed.* ***2025****, 64, e202418901*	16.82	1433-7851
36	Riya Jain, Ritu Raj, Mange Ram, Anju Rani, Saptarshi Ghosh Dastider, Rajendra Singh Dhayal, Krishna Kanta Haldar	$TiMn_2$ based bimetallic nano alloy electrocatalyst for improve hydrogen evolution reaction	Discover Electrochemistry, **2024**, 1doi.org/10.1007/s44373-024-00011-9	2.9	3005-1215
35	D. K. Jangid; S. G. Dastider; S. Mandal; P. Kumar; P. Kumari; K. K. Haldar; K. Mondal; **R. S. Dhayal**	Ferrocenyl Dithiophosphonate Ag(I) Complexes: Synthesis, Structures, Luminescence, and Electrocatalytic Water Splitting Tuned by Nuclearity and Ligands (***HOT ARTICLE***)	*Chem. Eur. J.*, **2024**, e202402900	5.04	0947-6539
34	P. Kumar, S. Khirid, D. K. Jangid, C. Shekhar Nishad, P. Chauhan, P. Kumari, S. Meena, S. K. Bose, A. Kumar, B. Banerjee, **R. S. Dhayal**	Dithiophosphonate Protected Eight-Electron Superatomic Ag21 Nanocluster: Synthesis, Isomerism, Luminescence and Catalytic Activity	*Inorg. Chem.* **2024, 63, 13724−13737**	5.436	0020-1669
33	A. Prakash, S. Basappa, B. Jeebula, D. H. Nagaraju, **R. S. Dhayal,** S. K. Bose	A Simple Nickel Metal−Organic Framework-Catalyzed Borylation of Aryl Chlorides and Bromides	*Org. Lett*., 2024, 26, 13, 2569–2573, March 25, 2024	5.2	1523-7060
32	S. Meena, S. G. Dastider, C. S. Nishad, D. K. Jangid, P. Kumar S. Khirid, S. K. Bose, K. Mondal, B. Banerjee, **R. S. Dhayal**	Ag-S Type Quantum Dots *vs* Superatom Nanocatalyst: A Single Sulfur Atom Modulated Decarboxylative Radical Cascade Reaction	*Inorg. Chem.* ***2023****, 62, 6092−6101*	5.436	0020-1669
31	R. Biswas, I. Ahmed, P. Manna, P. Mahata, ***R. S. Dhayal***, A. Singh, J. Lahtinen, K. Haldar	Facile Fabrication of Ni9S8/Ag2S Intertwined Structures for Oxygen and Hydrogen Evolution Reactions	*ChemPlusChem*, **2023**, *88*, e202200320.	3.210	2192-6506
30	S Saini, D. Gavali, R. Bhawar, R. Thapa, ***R. S. Dhayal***, S. K. Bose	Facile synthesis of alkyl- and arylboronate esters enabled by a carbon nanotube supported copper catalyst	*Catal. Sci. Technol*., **2023**, *13*, 147-156.	6.1191	2044-4753
29.	Dilip Kumar Jangid, Subash C. Sahoo, R. Jangir, R. Makde, A. Kumar, ***R. S. Dhayal****	Dithiophosphonate Anchored Heterometallic (Ag(I)/Fe(II)) Molecular Catalysts for Electrochemical Hydrogen Evolution Reaction	*Inorg. Chem.* **2022**, *61*, 13342−13354.	5.436	0020-1669

28	S. Khirid, D. K. Jangid, R. Biswas, S. Meena, S. C. Sahoo, V. P. Verma, C. Nandi, K. K. Haldar, Rajendra S. Dhayal.	Ferrocene decorated homoleptic silver(I) clusters: Synthesis, structure, and their electrochemical behaviour	Journal of Organometallic Chemistry 948 (**2021**) 121923	2.4	0022-328X
27	S. Khirid, R. Biswas, S. Meena, R. A. Patil, Y.-R. Ma, R. S. Devan, R. S. Dhayal, and K. K. Haldar.	Designing of Ag2S Nanowires from a Single-Source Molecular Precursor [(PPh3)2AgS2P(O*i*Pr)2] for Hydrogen Evolution Reaction	*ChemistrySelect* **2020**, *5*, 10593–10598	2.307	2365-6549
26	R. Biswasa, A. Kundua, M. Sahab, V. Kaurc, B. Banerjeea, R. S. Dhayala, R. A. Patild, Y.-R. Maa, T. Senc, and K. K. Haldara	Rational design of marigold shape composite Ni3V2O8 flower: a promising catalyst for oxygen evolution reaction	***New J. Chem.***, **2020**, 44, 12256-12265	3.925	1144-0546
25	R. Biswas, S. Khirid, M. Saha, C. W. Liu, R. S. Dhayal, K. K. Haldar	Seed free high yield gold nanorods synthesis from single precursor gold(I) dithiophosphate complex	Appl. Organomet. Chem. 2019, 33, e5220.	4.105	0268-2605
24	R. S. Dhayal, W. E. van Zyl, and C. W. Liu	Copper hydride clusters in energy storage and conversion	Dalton Trans., 2019, 48, 3531–3538	4.569	1477-9226
23	Rajendra S. Dhayal, Hsuan-Ping Chen, Jian−Hong Liao, Werner E. van Zyl, and C. W. Liu	Synthesis, Structural Characterization, and H_2 Evolution Study of a Spheroid-Shape Hydride-Rich Copper Nanocluster	ChemistrySelect 2018, 3, 3603 – 3610	2.307	2365-6549
22	R. S. Devan, V. P. Thakare, V. V. Antad, P. R. Chikate, R. T. Khare, M. A. More, R. S. Dhayal, S. I. Patil, Y.-R. Ma, L. S. Mende	Nano-Heteroarchitectures of Two-Dimensional MoS2@ One2 Dimensional Brookite TiO2 Nanorods: Prominent Electron Emitters 3 for Displays	ACS Omega 2017, 2, 2925−2934	4.132	2470-1343
21	R. S. Devan, Y.-R.M Ma, M. A. More, R. T. Khare, V. V. Antad, R. A. Patil, V. P. Thakare R. S. Dhayalf, L. S.-Mendeg	Promising field electron emission performance of vertically aligned one dimensional (1D) brookite (β) TiO2 nanorods.	*RSC Adv*., **2016**, *6*, 98722-98729	3.245	2046-2069
20	Rajendra S. Dhayal, Yan-Ru Lin, Jian-Hong Liao, Yuan-Jang Chen, Yu-Chiao Liu, Ming-Hsi Chiang, Samia Kahlal, Jean-Yves Saillard, and C. W. Liu	[Ag20{S2P(OR)2}12]: A Superatom Complex with a Chiral Metallic Core and High Potential for Isomeris	*Chem. Eur. J.* 2016, 2016, 22, 9943-9947	5.236	0947-6539
19	Rajendra S. Dhayal, Werner E. van Zyl and C. W. Liu	Polyhydrido Copper Clusters: Synthetic Advances, Structural Diversity and Nanocluster-to-Nanoparticle Conversion,	*Acc. Chem, Res*. **2016, 49, 86 - 95**	22.384	0001-4842
18	Rajendra S. Dhayal, Jian−Hong Liao, Yu-Chiao Liu, Ming-Hsi Chiang, Samia Kahlal, Jean-Yves Saillard, C. W. Liu	Diselenophosphate-Induced Conversion of an Achiral [Cu20H11{S2P(OiPr)2}9] into a Chiral [Cu20H11{Se2P(OiPr)2}9] Polyhydrido Nanocluster.	*Angew. Chem. Int. Ed. 2015, 54,* 13604 – 13608	16.82	1433-7851
17	Rajendra S. Dhayal, J.−H. Liao, S. Kahlal, X. Wang, Y.-C. Liu, M.-H. Chiang, W. E. van Zyl, J.-Y. Saillard, and C. W. Liu	$[Cu_{32}(H)_{20}\{S_2P(O^iPr)_2\}_{12}]$: The Largest Number of Hydrides Recorded on A Molecular Nanocluster by Neutron Diffraction	*Chem. Eur. J*. 2015, 21,8369 –8374	5.236	0947-6539

16	Rajendra S. Dhayal, Jian−Hong Liao, Yu-Chiao Liu, Ming-Hsi Chiang, Samia Kahlal, Jean-Yves Saillard, C. W. Liu	$[Ag_{21}\{S_2P(O^iPr)_2\}_{12}]^+$: An Eight-Electron Superatom,	***Angew. Chem. Int. Ed.*, 2015**, *54*, *3702 – 3706*	16.82 176.74	1433-7851
15.	**Rajendra S. Dhayal,** H.-N. Hou, R. Ervilita, P.-K. Liao, J.-H. Liao, and C. W. Liu	Copper(I) Diselenocarbamate Clusters: Synthesis, Structures and Single-Source Precursors for Cu and Se Composite Materials	***Dalton Trans, 2015, 44, 5898–5908.***	4.569	1477-9226
14.	J.-H. Liao, **Rajendra S. Dhayal** , X. Wang, S. Kahlal, J.-Y. Saillard, C. W. Liu	Neutron Diffraction Studies on a Four-Coordinated Hydride in Near Square-Planar Geometry	***Inorg. Chem*. 2014**, *53,* 11140.	5.436	0020-1669
13.	A. J. Edwards,# **Rajendra S. Dhayal**,# P.−K. Liao, J.−H. Liao, M.-H. Chiang, R. O. Piltz, S. Kahlal, J.-Y. Saillard, C. W. Liu # (equally contributed)	Chinese Puzzle Molecule: A Fifteen Hydride, 28 Copper Nanoball	***Angew. Chem. Int. Ed.* 2014**, 53, 7214 (**Selected for Front cover page of Journal)**	16.82	1433–7851
12.	**Rajendra S. Dhayal**, J.-H. Liao, Yan-Ru Lin, P.-K. Liao, S. Kahlal, J.-Y. Saillard, C. W. Liu	A Nanospheric Polyhydrido Copper Cluster of Elongated Triangular Orthobicupola Array: Liberation of H_2 from Solar Energy	***J. Am. Chem. Soc.* 2013**, *135*, 4704	16.38	0002-7863
11.	Y.-J. Li, C. Latouche, S. Kahlal, J.-H. Liao, **Rajendra S. Dhayal,** J.-Y. Saillard, C. W. Liu	A μ_9-Iodide in a Tricapped Trigonal-Prismatic Geometry	***Inorg. Chem*. 2012**, *51*, 7439	5.436	0020-1669
10.	**Rajendra S. Dhayal**, K. K. Verma Chakrahari, B. Varghese, S. M. Mobin and S. Ghosh,	Chemistry of Molybdaboranes: Synthesis, Structures and Characterization of a New Class of Open-Cage Dimolybdaheteroborane Clusters.	***Inorg. Chem.*, 2010**, 49, 7741.	5.436	0020-1669
9.	**Rajendra S. Dhayal**, S. Sahoo, K. H. K. Reddy, S. M. Mobin, E. D. Jemmis and S. Ghosh,	Vertex-Fused Metallaborane Clusters: Synthesis, Characterization and Electronic Structure of $[(\eta^5\text{-}C_5Me_5Mo)_3MoB_9H_{18}]$.	***Inorg. Chem.*, 2010**, *49*, 900.	5.436 236.13	0020-1669
8.	Sahoo, K. H. K. Reddy, **Rajendra S. Dhayal,** S. M. Mobin, V. Ramkumar, E. D. Jemmis and S. Ghosh,	Chlorinated Hypoelectronic Dimetallaborane Clusters: Synthesis, Characterization and Electronic Structures of $(\eta^5\text{-}C_5Me_5W)_2B_5H_nCl_m$ (n = 7, m = 2 and n = 8, m = 1).	***Inorg. Chem.*, 2009**, *48*, 6509.	5.436	0020-1669
7.	K. V. Chakrahari, A. Thakur, B. Mondal, **Rajendra S. Dhayal**, V. Ramkumar, S.Ghosh	A close-packed boron-rich 11-vertex molybdaborane with novel geometry	***J. Organomet. Chem*., 2012**, *710*, 75	2.4	0022-328X
6.	**Rajendra S. Dhayal**, P. S. Joseph, S. Sahoo, S. Ghosh	Synthesis and structural characterization of an open cage dithiatungstaborane [(CpW)2B4H4S2] cluster	***Indian J. Chem., Sec. A,* 2011**, 50, 1363-1368.	0.566	0376-4710
5.	**Rajendra S. Dhayal,** V. Ramkumar, S. Ghosh.	Synthesis, Structure and Characterization of Dimolybdaheteroboranes.	***Polyhedron,* 2011**, 30, 2062.	3.052	0277-5387
4.	K. V. Chakrahari, **Rajendra S. Dhayal**, S. Ghosh,	Synthesis and characterization of binuclear μ-oxo and μ-telluro molybdenum(V) complexes $[Cp^*Mo(O)(\mu\text{-}Te)]_2$.	***Polyhedron*, 2011**, 30, 1048-1054.	3.052 224.41 3669	0277-5387
3.	S. Sahoo, **Rajendra S. Dhayal**, B. Varghese and S. Ghosh	Unusual Open Eight-Vertex Oxamolybdaboranes: Structural Characterizations of $(\eta^5\text{-}C_5Me_5Mo)_2B_5(\mu_3\text{-}OEt)H_6R$ (R = H and n-BuO).	***Organometallics*, 2009**, *28*, 1586-1589	3.876	0276-7333

2.	**Rajendra S. Dhayal**, K. K. V. Chakrahari, V. Ramkumar and S. Ghosh,	B-Alkylation and Arylation of $[(\eta^5\text{-}C_5Me_5Mo)_2B_5H_9]$: Synthesis and Characterization of Isomeric $(\eta^5\text{-}C_5Me_5Mo)_2B_5H_{9-n}R_n$ (When R = n-Bu: n = 2, 1; R	**J. *Clust. Sci*., 2009**, *20*, 565-572	3.061	1040-7278
1.	**Rajendra S. Dhayal**, S. Sahoo, V. Ramkumar, S. Ghosh	Substitution at Boron in Molybdaborane Frameworks: Synthesis and Characterization of Isomeric $(\eta^5\text{-}C_5Me_5Mo)_2B_5H_nX_m$ (When X = Cl: n = 5,7,8; m = 4,2,1 and when X = Me: n = 6,7;	***J. Organomet. Chem*., 2009**, *694*, 237.	2.4 259.86/ 40	0022-328X

Press Releases

http://www.ansto.gov.au/AboutANSTO/News/ACS051619
New molecule puts scientists a step closer to understanding hydrogen storage - See more at:
http://www.ansto.gov.au/AboutANSTO/News/ACS051619#sthash.6SKzGNyU.dpuf
http://nsrrc.com/neutron/modules/tadnews/index.php?ncsn=1

CONFERENCES (Invited Talks, Presentations at International and Nationals levels)
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S. No.	Title of paper presented	Title of conference/Seminar etc.	Date of the events	Organized by	Whether International/ National/State/ regional/University or college level
50	Nanoclusters in renewable energy and Pharmacy, Invited Talk	Renewable Energy	17-18 March, 2026	Physics Dept, University of Rajasthan	International
49	Mono-layer Protected Nanoclusters, Invited Talk	Sustainable Development in Chemical Sciences	August 20-22, 2025	Akal University, Punjab	International
48	Metal Nanoclusters Tuned by Asymmetric Dichalcogenides, Invited Talk	International Symposium on Monolayer Protected Clusters	from 21st to Sept, 2025	IISER Trivandrum and IITM	International
47	Monolayer-Protected Coinage Metal Nanoclusters, Invited Talk	MTIC	18-21 December, 2025	Delhi University	International
46	Inida`s March Towards Viksit Bharat@2047: A Strategy and Policy Perspective, Invited Talk	Two days National Seminar	5-6 March, 2025	Central University of Punjab	National
45	Atomically Precise Coinage Nanoclusters for Sustainable and Chemical Applications, Invited Talk	DST-Purse: Catalysis for sustainable Chemicals, Materials and Energy	24-26 February, 2025	Department of Chemistry, Thapar University, Patiala	National
44	Functionality and Properties of Dichalcogenide Controlled Precise Metal Nanoclusters, Invited Talk	DST-JSPS Joint Workshop, Atomically Precise Materials for Sustainability	1-3 February, 2025	Department of Chemistry, IIT Madras	International

43	**CoE International Conference on Molecular Materials and Functions - 2024,** Invited Talk	**Symmetric and Asymmetric Dithiolate-Fabricated Atomically Precise Coinage Metal Nanoclusters**	**9-11 December 2024**	**Department of Chemistry, IIT Madras**	**International**
	CoE Winter School on Molecular Materials and Functions -2024, Invited Talk	**Dichalcogenolate Stabilized Atomically Precise Coinage-Metal Nanoclusters/Clusters: Synthesis, Characterization, and Applications-2024**	**04-08 December 2024**	**Department of Chemistry, IIT Madras**	**International**
42	**Applications of the IR spectroscopy in current Scenario, As the Organizing committee Member,** Invited Talk	**Workshop on Spectroscopic Techniques and Instrumental Analysis**	**14 November, 2024**	**Dept. of Chemistry, Central University of Punjab, Bathinda**	**National**
41	**Applications of the IR spectroscopy in current Scenario,** Invited Talk	**Workshop on Spectroscopic Techniques and Instrumental Analysis**	**24-25 October, 2024**	**Dept. of Chemistry, Central University of Punjab, Bathinda**	**National**
40	**Coinage Nanoclusters and Their Applications in Sustainable Energy,** Invited Talk	**Frontier in Sustainable Catalysis and Organometallics (FISCO-2024)**	**11-12 July 2024**	**Department of Chemistry, MNIT Jaipur**	**International**
39	Attend the conference	'Resurgent Bharat on the Global Canvas	25-26 February 2024	Ambedkar International Centre, NCPSL and Shivaji college, Delhi	**International**
38.	As the Judge for Pure Science, 16th Avishkar: Maharashtra State-University Research Convention, Invited Talk	Maharashtra State	12-15 January, 2024	Maharashtra University of Health Sciences, Nasik	**State**
37.	Metal Nanoclusters versus Quantum Dots and Their Applications in sustainable Energy, Invited Talk	National Conference on Recent Trends in Polymer and Chemical Sciences	5-6 January, 2024	Department of Chemistry, University college of Science, Mohallal Sukhadia University, Udaipur	**National**
36.	Nanocluster Chemistry of Coinage Metal clusters and Applications, Invited Talk	Recent Trends in Chemicals-Sciences-2023	6 Nov., 2023	PG Department of Chemistry of Government Chhatarpur, Odisha	**National**

35.	Atomically Precise Coinage Metal Polyhydrides, Superatom Nanoclusters, Quantum Dots and Applications , Invited Talk	National Conference on Emerging Fronters in Chemical Sciences **(NCeFCS 2023)**	5-6, Nov, 2023	Dept. Of Chemistry, Berhampur University, Odisha	**National**
34	Infra-Red Spectroscopy: Theory and Instrumentation, Invited Talk	Workshop on Spectroscopic Techniques Using Sophisticated Instruments-2	03rd Oct. 2023 to 09th Oct. 2023.	Department of Chemistry, Central University of Punjab Bathinda	**National**
33.	Applied Ethics of Multi Nuclear NMR Spectroscopy in Inorganic, Organic and Bio-Inorganic molecules, Invited Talk	Baba Farid College Bathinda, Punjab	10-11/04/2023	Baba Farid College	**National**
32	Indus Synchrotron Radiation- application in nanoclusters, Invited Talk	spectroscopy using Indus Synchrotron Radiation-2023	March 24th and 25th, 2023	RCAT Convention Centre in Indore-452013.	**National**
31.	Atomically Precise Coinage Metal Polyhydrides, Superatom Nanoclusters, Quantum Dots and Their Applications **Invited Talk (Physically)**	**Molecular Materials and Functions-2022**	**5-7 Dec., 2022**	**Raman Hall** **Block-E, Research Park, IIT Madras**	**International**
30	**Synthesis of Clusters and Nanoclusters** **Invited Talk (Online)**	**Materials Engineering from Synthesis to Applications**	**22-02-** **2022** **21 to 26 feb 2022**	**Department of Metallurgy Engineering and Materials Science, IIT Indore**	**National**
29	**Development and applications of nanoclusters in nanoscience** Invited Talk (Online)	Faculty Development Programme-under UGC	20-24 Jan 22	Poddar International College, Jaipur	**National**
28	**Atomically Precise Coinage Nanoclusters : Synthesis, Characterization, and application in HER Study, Invited talk as resource** Invited Talk (Online)	**ICT integrated Padagogy in teaching of chemistry, Mathmatics and life sciences**	**17-21st January, 2022**	**Regional Institute of Education, NCERT, Ajmer**	**National**
27	Infra-Red Spectroscopy: Theory and Instrumentation Invited Talk (Online)	Workshop on "Spectroscopic Techniques Using Sophisticated Instrument	October 18-24, 2021	Dept. of Chemistry, Central University of Punjab	**National**
26	Dichalcogenide Stabilize Coinage Nanoclusters: Synthesis, Characterization, and HER Study Invited Talk (Online)	Indo-Japan Virtual Workshop on cluster Science by Interdisciplinary Approach: Emerging	3-5 sept, 2021	Centre of Excellence on Molecular Materials and Functions, IIT Madras	International

		Materials and Phenomena			
25	**Electron Spin Resonance Spectroscopy in Inorganic, Organic and Bio-Inorganic Applications** **Invited Talk (Online)**	Spectroscopic Studies in Structural Analysis Modern era Application	25th to 29th January 2021	Hyderabad Institute of Technology and Managment	**National**
24	**Coinage nanoclusters cluster: Synthesis, Characterization, and HER Study** **Invited Talk (Online)**	**"International e-** **Conference on Nonmaterials and Nanotechnology (IeCONN-2021)"**	**March 25-27th, 2021**	**Department of Physics, University of Mumbai,** **Maharashtra, India.**	**International**
23	**Coinage Cluster: Synthesis, Characterization, and HER Study** **Invited Talk (Online)**	**Frontiers in Organometallic and Catalysis** **(FOMC –2021)**	**20thto 22ndJanuary 2021**	**Malviya National Institute of Technology Jaipur**	**International**
22	**Copper and Silver Nanocluster: Synthesis, Characterization, and HER Study** **Invited Talk (Online)**	***National Conference on Physics and Chemistry of Materials (NCPCM2020)***	***during 14th- - 16th December, 2020.***	**Dept. of Physics, Govt. Holkar Science College, Indore**	**National**
21	Higher Nuclearity Cu and Ag Nanocluster: Synthesis, Characterization, and HER Study **Invited Talk (Online)**	International Online Conference on Macromolecules (ICM 2020)	13th-15thNovember2020Kottayam,Kerala,India	Mahatma Gandhi University, P.D Hills P.O, Kottayam, Kerala, India & Gdansk University of Technology, Chemical Faculty, Gdansk, Poland	International
19-2	Invited to Discussed	New Education Policy on Technical	6th march 2020	National Institute of Technical	National

		Education and Challenges		Teachers Training and Research, MHRD, Govt. of India	
20	Coinage metal nanoclusters supported by hydrides and dichalcogenolates **Invited Talk**	Trends and Innovation in Chem Sci	Dec., 6-7, 2019.	RNT, Kapasan, Udaipur	National
19	Coinage Metal Nanocluster: H_2 Evolution and Formation of Nanoparticle **Invited Talk**	Fronteir at the Chemistry-Allied Sciences Interface	21-22 Dec, 2018	Dept of Chemistry, Unvi. Of Rajasthan Jaipur	International
18	Coinage Metal Nanocluster: Synthesis, Characterization, and H_2 Evolution Study **Invited Talk**	63rd DAE Solid state Physics Symposium	Dec 18-22, 2018	Bhabha Atomic Research Centre	International
17	Hydride-Rich Copper Nanocluster: Synthesis, Characterization, and H_2 Evolution Study **Invited Talk**	Applied materials	6-7th April, 2018 (going to attend)	Central University of Gujarat	National
16.	Nanomaterials of coinage metals **Invited Talk**	Recent Advances in Chemical, Biological & Environmental Sciences (RACES-2018)	February 09-10, 2018	M. Modi college, Patiala	National
15.	Hydride-Rich Nanocluster **Invited Talk**	international conference on nanotechnology	05-08 Dec., 2017	IIT Roorke	International
14	Coinage Metal Nanoclusters Stabilized with Chalcogenide Ligands **Invited Talk**	Frontiers at the Chemistry - Allied Sciences Interface, UOR, Jaipur	22-23 July, 2017.	University of Rajasthan Jaipur	International
13	X-ray and Neutron Diffraction of Coinage Metal Nanoclusters Enclosed by Dichalcogenide Ligands **Invited Talk**	45th National Seminar on Crystallography, IIT BHU	9-12 July, 2017	IIT BHU	National
12	Intrinsic Chirality within Copper Nanocluster **Invited Talk**	International Conference on Technologically Advanced Materials & Asian Meeting on Ferroelectricity (ICTAM-AMF10)	November 7-11, 2016	University of Delhi	International

11	Nanocluster for H2 evolution **Invited Talk**	2nd conference on microscopy in Material Science	25-27 Feb, 2016	Thapar University Patiala	National
10	Stable Polyhydrido Copper Nanoclusters **Invited Talk**	*Recent Advancements in Chemical Sciences (RAICS-2015)*	August 21-23, 2015	MNIT Jaipur	National
9	$[Cu_{32}(H)_{20}\{S_2P(O^iPr)_2\}_{12}]$: The Largest Number of Hydrides Recorded on A Molecular Metal Cluster by Neutron Diffraction, POSTER present	Frontiers at the Chemistry-Allied Sciences Interface (FCASI-2015)	March(13-14th), 2015	Univ. of Rajasthan	National
8.	Solar H_2 Evolution from Polyhydrido Copper Nanoclusters and Complete Reduction of Hydrido Clusters by Borohydride: Formation of Rhombus-Shaped Copper Nanoparticles **Invited Talk**	The 11th Taiwan-U.S. Air Force Nanoscience Program Review & Workshop	May (13-15), 2014	NDHU, Hualien, Taiwan	International
7.	Synthesis of a New class of Open-Cage Dimolybdaheteroborane Clusters,	*Inaugurated conference on molecular and functional catalysis (ICMFC)-1, Singapore*	11-15 July, 2010	National University Singapore	International
6.	Vertex-Fused Metallaborane Clusters: Synthesis, Characterization and Electronic Structure of $[(\eta^5\text{-}C_5Me_5Mo)_3MoB_9H_{18}]$,	*Inorganic Ring Systems-12*, Goa, India,	16-21 August, 2009	Indian Institute of Technology, Bombay	International
5.	Nanosized Copper Polyhydrido cluster:$[Cu_{32}(H)_{20}\{S_2P(O^2Bu)_{12}\}]$,	Annual Meeting of Chemical Society, Taiwan	Nov., 2013	NTHU, Taiwan	National
4.	Hydrido Copper (1) clusters stabilized by diselenocarbamate ligands	Annual Meeting of Chemical Society, Taiwan	Dec., 2012	National Cheng Kung University(NCKU), Tainan,	National
3.	Unusual Open Eight-Vertex Oxamolybdaboranes: Structural Characterizations of $(\eta^5\text{-}C_5Me_5Mo)_2B_5(\mu_3\text{-}OEt)H_6R$ (R = H and *n*-BuO).	*11th CRSI national Symposium in Chemistry, Pune*	6-8 Feb., 2009	NCL, Pune	National
2.	Chlorinated Hypoelectronic Dimetallaborane Clusters: Synthesis, Characterization and Electronic Structures of $(\eta^5\text{-}C_5Me_5W)_2B_5H_nCl_m$ (n = 7, m = 2 and n = 8, m = 1).	*Modern Trends in Inorganic Chemistry-XII*, IIT Madras, India,.	Dec., 2007	Indian Institute of technology, Madras	National

1.	($RhCl(PNp_3)_3$, tri-1-naphthylphosphine complex of Ruthenium(II) as regioselective catalyst for hydrogenation of alkenes.	(Indian Chemical Society), Vadodara	22 Jan., 2006.	University Vadodara	State /University Level

Sl. No.	**Name of Scholar**	**Title of Dissertation**	**Name of Department & University Guided**	**Date of Award**
1	Mr. Dependu Dolui (15mscsoi07)	Heteroleptic Metal complexes stabilized by Dithiocarbamate and phosphine ligand	Dept of Chemical Sciences, Central University of Punjab, Bathinda	June, 2017
2	Ms. Jyoti (15mscsoi15)	Metal-Ligand Synthesis (Via S-Methyldithiocarbazate and S-Benzyldithiocarbazate Ligand)	Dept of Chemical Sciences, Central University of Punjab, Bathinda	June, 2017
3	Ms. Kirti (15mscsoi13)	Synthesis and Characterization of bimetallic compose 1-D material from single molecular precursor	Dept of Chemical Sciences, Central University of Punjab, Bathinda	June, 2017
4	Ms. Sandeep Kaur (16mscchm06)	Synthesis and Characterization of Copper hydride	Dept of Chemical Sciences, Central University of Punjab, Bathinda	May 2018
5	Swayamprakash Biswal (16mscchm07)	Synthesis and Characterization of Bis-Dithiocarbamate Stabilized copper and silver complexes	Dept of Chemical Sciences, Central University of Punjab, Bathinda	May 2018
6	Sambit Shashanka Sekhar Rout	Synthesis and Characterization of Copper and Silver Complexes stabilized by Dithiocarbazates	Dept of Chemical Sciences, Central University of Punjab, Bathinda	May 2018
7	Anu Bovas (17mscchm13)	Synthesis and Characterization of Cu and Ag Complexes Stabilized with 1,4-Bis(3-ethyl-1-	Dept of Chemical Sciences, Central	May 2019

		imidazolium)benzene Bis(hexafluorophosphate)	University of Punjab, Bathinda	
8	Preetika (17mscchac-03)	Synthesis and Characterization of Cu and Ag complexes stabilized by 1,2,4,5-tetrakis(3-ethyl-1imidazolium)benzene tetrakis-(hexaflorophosphate)	Dept of Chemical Sciences, Central University of Punjab, Bathinda	May 2019
9	Mohd Sufiyan	Synthesis and Charcterization of 1,3,5-tri(1H-imidazolyl) benzene	Dept of Chemical Sciences, Central University of Punjab, Bathinda	May 2019
10	Ritu Poonia (17mscchm16)	Stabilization and characterization of Group-11 Transistion metal complexes with Tris(Pyridine-2-ylthio)Methane	Dept of Chemical Sciences, Central University of Punjab, Bathinda	May 2019
11	Archo Masuma (18mschac20)	Copper Hydride Complex Stabilized By N – Octyl DTC Ligand	Dept of Chemical Sciences, Central University of Punjab, Bathinda	June 2020
12	Avanish Kumar Singh(18mscchm15)	Complexation of Copper and Silver metal with triphenylphosphine sulphide ligand	Dept of Chemical Sciences, Central University of Punjab, Bathinda	June 2020
13	Kausalya rani parida (18MSCCHM31)	PRESENTATION ON 2-MERCAPTO BENZIMIDAZOLE STABILISED Cu COMPLEX	Dept of Chemical Sciences, Central University of Punjab, Bathinda	June 2020
14	Neha Garg, (18mscchm32)	LUMINESCENT CLUSTERS OF COINAGE METALS SUCH AS Cu(I), Ag(I) and Au(I) AND STUDIED THEIR EMISSIVE NATURE	Dept of Chemical Sciences, Central University of Punjab, Bathinda	June 2020
15	Rahul.N (18mscchm05)	Synthesis and Characterisation of Ag complex of triphenylphosphine dithiophosphonate	Dept of Chemical Sciences, Central	June 2020

			University of Punjab, Bathinda	
16	Rajesh Khatua (18mschac09)	Synthesis of Ag Cluster With Ferrocenyl-dithiophosphonate Ligand	Dept of Chemical Sciences, Central University of Punjab, Bathinda	June 2020
17	Twinkle Jain (18mschac02)	Stabilization of Group-11 Transition Metal Complexes Ligated with Dithiophosphate Ligands	Dept of Chemical Sciences, Central University of Punjab, Bathinda	June 2020
18	Swati Gupta, (18mscchm19)	Fabrication by 1,4-BIS (3-ETHYL-1-IMIDAZOLYL-2-THIONE) BENZENE Of COINAGE METAL: COPPER and SILVER	Dept of Chemical Sciences, Central University of Punjab, Bathinda	June 2020
19	Bedanta Bikash Ojah 19mscchm28	COPPER(I) FERROCENYLDITHIOPHOSPHONATE CLUSTER: SYNTHESIS AND CHARACTERIZATION	Dept of Chemical Sciences, Central University of Punjab, Bathinda	June 2021
20	CHESTHA SINGHAL 19MSCCHM29	SYNTHESIS AND CHARACTERISATION OF METAL COMPLEXES WITH DITHIOPHOSPHONATE LIGAND OF GROUP-11 METALS, COPPER (Cu) AND SILVER (Ag)	Dept of Chemical Sciences, Central University of Punjab, Bathinda	June 2021
21	GURPREET SINGH 19mscchm06	REVIEW ON COPPER DITHIOCARBAMATE COMPLEXES	Dept of Chemical Sciences, Central University of Punjab, Bathinda	June 2021
22	Sivam Tripathi 19mschac01	Synthesis of Hg and Cd metal clusters from Sodium Isobutyl Trithiocarbonate	Dept of Chemical Sciences, Central University of Punjab, Bathinda	June 2021
23	Shubham 19mschac08	Synthesis and characterization of a Dithiophosphonate ligand stabilized copper complex	Dept of Chemical Sciences, Central	June 2021

			University of Punjab, Bathinda	
24	SUMIT RANJAN 19mschac04	A REVIEW ON TRANSITION METAL COMPLEXES WITH DITHIOPHOSPHONATE LIGAND	Dept of Chemical Sciences, Central University of Punjab, Bathinda	June 2021
25	Swati Jakhmola (19mscchm24)	SYNTHESIS OF CADMIUM AND MERCURY METAL CLUSTERS WITH SODIUM ISOPROPYL CARBONOTRITHIOATE	Dept of Chemical Sciences, Central University of Punjab, Bathinda	June 2021
26	Akanksha Maurya (20mschac05)	SYNTHESIS AND CHARACTERIZATION OF COPPER NANOCLUSTER WITH DITHIOCARBAMATE LIGAND	Dept of Chemical Sciences, Central University of Punjab, Bathinda	June 2022
27	AMAN SAHU, 20mschac08	DITHIOPHOSPHONATE LIGATED Co(II) COMPLEX: SYNTHESIS AND CHARACTERIZATION	Dept of Chemical Sciences, Central University of Punjab, Bathinda	June 2022
28	Aparna R 20mschac18	SYNTHESIS AND CHARACTERIZATION OF NICKEL FERROCENYL DITHIOPHOSPHONATES COMPLEXES	Dept of Chemical Sciences, Central University of Punjab, Bathinda	June 2022
29	EMILIN FRANCIS, 20mschac14	SYNTHESIS AND CHARACTERISATION OF COBALT COMPLEXES WITH DITHIOPHOSPHONATE LIGANDS	Dept of Chemical Sciences, Central University of Punjab, Bathinda	June 2022
30	Krishnendu G 20mscchm12	SYNTHESIS AND CHARACTERISATION OF ALLOY NANOCLUSTERS OF GROUP-11 METAL (Cu&Ag) BY USING ISOPROPYL TRITHIOCARBONATE	Dept of Chemical Sciences, Central University of Punjab, Bathinda	June 2022

31	Preeti, 20mscchm29	Synthesis and Characterization of Lanthanum complexes with Dithiophosphonates Ligand.	Dept of Chemical Sciences, Central University of Punjab, Bathinda	June 2022
32	PUNEET KUMAR, 20mscchm10	THIOLATE PROTECTED copper NANOCLUSTERS: SYNTHESIS AND CHARACTERIZATION	Dept of Chemical Sciences, Central University of Punjab, Bathinda	June 2022
33	Riya, 20mscchm32	SYNTHESIS AND CHARACTERIZATION OF CERIUM COMPLEXES WITH DITHIOPHOSPHONATE LIGANDS	Dept of Chemical Sciences, Central University of Punjab, Bathinda	June 2022
34	SMITA PATEL , 20mschac07	Coinage Metal Complexes with Dithiophophonate ligand	Dept of Chemical Sciences, Central University of Punjab, Bathinda	June 2022
35	Neetu Badhala 21mscchm16	Synthesis and characterization of Cd(ii), Hg(ii), and Fe(ii) complexes stabilized by ferrocenyl dithiophosphonate ligand	Dept of Chemical Sciences, Central University of Punjab, Bathinda	June 2023
36	Vipul Matoliya	Synthesis and characterization of ferrocenyl dithiophosphonate ligated heterometallic cu and Zn complexes	Dept of Chemical Sciences, Central University of Punjab, Bathinda	June 2023
37	Deepika Chauhan 21mschac13	Synthesis and characterization of high nuclearity silver nanoclusters stabilized by thioxanthate ligan	Dept of Chemical Sciences, Central University of Punjab, Bathinda	June 2023
38	Arathi Krishna k 21mschac22	Synthesis and characterization of thiolate protected silver nanoclusters	Dept of Chemical Sciences, Central University of Punjab, Bathinda	June 2023
39	Vasudev, 21mscchm17	Synthesis and characterization of thioxanthate stabilized copper complex	Dept of Chemical Sciences, Central	June 2023

			University of Punjab, Bathinda	
40	ANEES MOOSA Regd. No. 22mscchm65	Synthesis and Characterization of Dithiophosphonate Ligated Cu(I) and Ag(I) Complexes	Dept of Chemical Sciences, Central University of Punjab, Bathinda	June 2024
41	Annu Devi Reg. no: 22mscchm41	Synthesis and characterization of Silver nanoclusters Fabricated with thiolate ligand	Dept of Chemical Sciences, Central University of Punjab, Bathinda	June 2024
42	Anurag Mishra, Reg. No. – 22mscchm48	Fabrication of Cu(I) and Ag(I) Complexes with Dithiophosphonate Ligand and their Characterization	Dept of Chemical Sciences, Central University of Punjab, Bathinda	June 2024
43	Parvathi Rajesh, 22mschac10	Ferrocene Decorated Heterometallic Copper(I) Complexes: Synthesis and Characterization	Dept of Chemical Sciences, Central University of Punjab, Bathinda	June 2024
44	Pritam Kumar Reg No. 22mschac29	Dithiophosphonate Fabricated Tetranuclear Cu(I) and Ag(I) Clusters: Synthesis and Characterizations	Dept of Chemical Sciences, Central University of Punjab, Bathinda	June 2024
45	Radila Sangtam 22mschac24	Ferrocenyldithiophosphonate Fabricated Tetranuclear Copper Complexes: Synthesis and Characterization	Dept of Chemical Sciences, Central University of Punjab, Bathinda	June 2024
46	**Ritika Sharma** 22mscchm66	Ferrocenyl Dithiophosphonate Stabilized Tetrameric and Polymeric Cu(I)/Ag(I) Complexes: Synthesis and Characterization	Dept of Chemical Sciences, Central University of Punjab, Bathinda	June 2024
47	**Manu Sharma**	Silver Nanocluster Protected by tert-Butyl Thioxanthate: Synthesis and Characterization	Dept of Chemical Sciences, Central University of Punjab, Bathinda	June 2025

48	**Farsa Ram**	Feerocenyldithiophosphonate Stabilized Copper Complex: Synthesis and CHaracterization	Dept of Chemical Sciences, Central University of Punjab, Bathinda	June 2025
49	**Rishav Thakur**	Synthesis and Characterization of Halide Centred Dithophosphoante Ag8/Cu8 Cluster	Dept of Chemical Sciences, Central University of Punjab, Bathinda	June 2025
50	**Partha Pritam Deka**	Heterobimetallic Cu(I) dithiophoshate Complexes: Synthesis and Structral Characterization	Dept of Chemical Sciences, Central University of Punjab, Bathinda	June 2025
51	**Pramodh T T**	Ferrocenyl Dithiophonate Stabilized Tetrahedral CuI Cluster: Synthesis and Characterization	Dept of Chemical Sciences, Central University of Punjab, Bathinda	June 2025
52	**Shameena Jasmin**	Chloride centered Ag8/Cu8 Clusters: Synthesis and Characterization	Dept of Chemical Sciences, Central University of Punjab, Bathinda	June 2025
53	**Tarandeep Kaur**	**Phosphor-1,1-dithiolates CuI complex Synthesis and Characterization**	Dept of Chemical Sciences, Central University of Punjab, Bathinda	June 2025

(i) Research Projects

Sl. No.	**Title of Project**	**Funding Agency & Year of Funding**	**Project Duration**	**Grant/ Amount Mobilized (Rs. Lakh)**	**More than or less than 10 lakhs**	**Whether completed or Ongoing**	**Score**

1	Dithiolates-fabricated coinage metal hydrides synthesis, characterization and their applications, Sole PI	DST_SERB, CRG	2024-27	33.0	More	Ongoing	10
2	Synthesis and characterization of polyhydrido Cu and Ag nanoclusters and their applications	DST-SERB, 2016-19	2016-19	27.4	More	completed	10
3	Stabilization of copper polyhydrides by diselenocarbamate ligand	CUPB-Seed money, 2016-17	2016-17	03	Less	completed	05
4	Molecular structural changes through ligand exchange on copper clusters and their applications	UGC-Startup	2017-2019	06	Less	completed	05
5	Role of Boron passivated 1D NiO nanostructures in the next generation charge/energy storage devices	UGC-DAE	2016-19	13	More	completed	05
						Total Score Claimed	**25**

(i) Awards/ Fellowships

Sl. No.	Title of Award/ Fellowship	Year	Conferred by Organization	International/National	Score
1	**Junior Research Fellow**			**National**	5
2.	**Post-doctoral research fellowship**			**National**	5
3.	**DST-SERB Young Scientist Award**			**National**	5
1	Best Teacher Award CUPB	2017	Central University of Punjab	**National**	5
2	Research Award with IF more than 10 IF	2017	Central University of Punjab	**National**	5
3	Research Award with IF more than 15 IF	2017	Central University of Punjab	**National**	5
4	Outstanding Research Award	2017	Central University of Punjab	**National**	5
5	Cumulative Outstanding Research Award	2017	Central University of Punjab	**National**	5
6	Best Teacher Award	2019	Central University of Punjab	**National**	5
				Total Score Claimed	**30/45**