

Name: Dr. Rajendra Singh Dhayal

Designation: Assistant Professor

Centre: Chemical Science

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Education

Ph.D. (January 2007-June 2011) from Department of Chemistry, Indian Institute of Technology, Madras.
M.Sc. (2004) from Department of Chemistry, University of Rajasthan, Jaipur, Rajasthan.
B.Sc. (2001) S. K. College, Sikar, Rajasthan.

Experience

Assistant Professor (July, 2014 Onwards) at School of Basic and Applied Sciences, Centre for chemical Sciences, Central university of Punjab, Bathinda, Punjab, India.
Assistant Professor (December, 2014 to July, 2015) at School of Chemistry and Biochemistry, Thapar University, Patiala, Punjab, India.
Post-doctoral Position (August 2011 to December 2014) at Department of Chemistry, National Dong Hwa University, Hualien, Taiwan
Project Fellow (JRF), (January, 2005 to December, 2006) at Central Salt and Marine Chemical Research Institute (CSIR-Lab), Bhavnagar, Gujarat.

Teaching Assignments

CHM.502: Inorganic Chemistry – 1
CHM.505: Spectral Analysis
CHM.507: Inorganic Practical

Research Project

Handled

Ongoing

DST - Start-Up Research Grant (Young Scientists),
Grant Sanction - 35 Lakh,
Period – 2015 to 2018

Professional Recognition /Awards/Scholarship

- MOST Post-Doctoral Fellowship (2011- 2014), NDHU, Taiwan.
- Senior Research Fellowship (UGC-SRF), (2011), IIT Madras
- Junior Research Fellowship (UGC-JRF), (2008), IIT Madras
- GATE Fellowship (2005, 2006), CSMCRI (CSIR-Lab) Bhavnagar, Gujarat.
- CSIR-NET 2005, 2006, 2007.
- GATE – 2006 {Score = 376, AIR = 381, 92 Percentile}, 2005 (Score = 341, AIR = 416, 90 Percentile)
- Qualified DRDO-SET 2008

Peer Recognition

Play role as reviewer in many of International and national Journals

Area specializations/Research Interest

- Metal hydrides and their applications.
- Super atom Chemistry
- Chalcogen stabilized metal complexes and their applications. □
- Organometallic chemistry (synthesis and characterization of metallaborane, Metallaheteroborane)
- Hydrogenation and hydroformylation

Publications

Research Papers

1. Rajendra S. Dhayal, J.-H. Liao, X. Wang, Y.-C. Liu, M.-H. Chiang, S. Kahlal, J.-Y. Saillard, C. W. Liu, (2015) Diselenophosphates Induced Conversion of An Achiral $\text{Cu}_{20}(\text{H})_{11}\{\text{S}_2\text{P}(\text{O}^i\text{Pr})_2\}_9$ into A Chiral $[\text{Cu}_{20}(\text{H})_{11}\{\text{Se}_2\text{P}(\text{O}^i\text{Pr})_2\}_9]$, Polyhydrido Nanocluster *Angew. Chem. Int. Ed.*, **54**, 13604 (IF = 11.33)
2. Dhayal, R. S., Liao, J. H., Kahlal, S., Wang, X., Liu, Y. C., Chiang, M. H. & Liu, C. W. (2015). $[\text{Cu}_{32}(\text{H})_{20}\{\text{S}_2\text{P}(\text{O}^i\text{Pr})_2\}_{12}]$: The Largest Number of Hydrides Recorded in a Molecular Nanocluster by Neutron Diffraction. *Chemistry-A European Journal*. **2015**, *21*, 8369. (IF = 5.97)
3. Dhayal, R. S., Liao, J. H., Hou, H. N., Ervilita, R., Liao, P. K., & Liu, C. W. (2015). Copper (i) diselenocarbamate clusters: synthesis, structures and single-source precursors for Cu and Se composite materials. *Dalton Transactions*, *44*(12), 5898-5908. (IF = 4.10)
4. Dhayal, R. S., Liao, J. H., Liu, Y. C., Chiang, M. H., Kahlal, S., Saillard, J. Y., & Liu, C. W. (2015). $[\text{Ag}_{21}\{\text{S}_2\text{P}(\text{O}^i\text{Pr})_2\}_{12}]^+$: An Eight-Electron Superatom. *Angewandte Chemie International Edition*, *54*(12), 3702-3706. (IF = 11.33)
5. Liao, J. H., Dhayal, R. S., Wang, X., Kahlal, S., Saillard, J. Y., & Liu, C. W. (2014). Neutron Diffraction Studies of a Four-Coordinated Hydride in Near Square-Planar Geometry. *Inorganic chemistry*, *53*(20), 11140-11145. (IF = 4.79)
6. Edwards, A. J., Dhayal, R. S., Liao, P. K., Liao, J. H., Chiang, M. H., Piltz, R. O., Kahlal, S., Saillard, J.-Y. & Liu, C. W. (2014). Chinese Puzzle Molecule: A 15 Hydride, 28 Copper Atom Nanoball. *Angewandte Chemie*, *126*(28), 7342-7346. (Selected for Front cover page of Journal). (IF = 11.33)
7. Dhayal, R. S., Liao, J. H., Lin, Y. R., Liao, P. K., Kahlal, S., Saillard, J. Y., & Liu, C. W. (2013). A Nanospheric Polyhydrido Copper Cluster of Elongated Triangular Orthobicupola Array: Liberation of H_2 from Solar Energy. *Journal of the American Chemical Society*, *135*(12), 4704-4707. (IF = 11.44)
8. Li, Y. J., Latouche, C., Kahlal, S., Liao, J. H., Dhayal, R. S., Saillard, J. Y., & Liu, C. W. (2012). A μ_9 -Iodide in a Tricapped Trigonal-Prismatic Geometry. *Inorganic chemistry*, *51*(14), 7439-7441. (IF = 4.79)
9. Dhayal, R. S., Chakrahari, K. K. V., Varghese, B., Mobin, S. M., & Ghosh, S. (2010). Chemistry of molybdaboranes: synthesis, structures, and characterization of a new class of open-cage dimolybdaheteroborane clusters. *Inorganic chemistry*, *49*(17), 7741-7747. (IF = 4.79)
10. Dhayal, R. S., Sahoo, S., Reddy, K. H. K., Mobin, S. M., Jemmis, E. D., & Ghosh, S. (2010). Vertex-Fused Metallaborane Clusters: Synthesis, Characterization and Electronic Structure of $[(\eta^5\text{-C}_5\text{Me}_5\text{Mo})_3\text{MoB}_9\text{H}_{18}]$. *Inorganic chemistry*, *49*(3), 900-904. (IF = 4.79)
11. Sahoo, S., Reddy, K. H. K., Dhayal, R. S., Mobin, S. M., Ramkumar, V., Jemmis, E. D., & Ghosh, S. (2009). Chlorinated Hypoelectronic Dimetallaborane Clusters: Synthesis, Characterization, and

Electronic Structures of (η^5 -C₅Me₅W) 2B₅H_nCl_m (n= 7, m= 2 and n= 8, m= 1). *Inorganic chemistry*, 48(14), 6509-6516. **(IF = 4.79)**

12. Chakrahari, K. K. V., Thakur, A., Mondal, B., Dhayal, R. S., Ramkumar, V., & Ghosh, S. (2012). A close-packed boron-rich 11-vertex molybdaborane with novel geometry. *Journal of Organometallic Chemistry*, 710, 75-79. **(IF = 2.30)**
13. Dhayal, R. S., Sahoo, S., & Ghosh, S. (2011). Synthesis and structural characterization of an open cage dithiatungstaborane [(CpW) 2B₄H₄S₂] cluster. *Indian Journal of Chemistry-Part A Inorganic Physical Theoretical and Analytical*, 50(9), 1363. **(IF = 0.63)**
14. Dhayal, R. S., Ramkumar, V., & Ghosh, S. (2011). Synthesis, structure and characterization of dimolybdaheteroboranes. *Polyhedron*, 30(12), 2062-2066. **(IF = 2.05)**
15. Chakrahari, K. K. V., Dhayal, R. S., & Ghosh, S. (2011). Synthesis and characterization of binuclear μ -oxo and μ -telluro molybdenum (V) complexes, [Cp* Mo (O)(μ -Te)]₂. *Polyhedron*, 30(6), 1048-1054. **(IF = 2.05)**
16. Sahoo, S., Dhayal, R. S., Varghese, B., & Ghosh, S. (2009). Unusual Open Eight-Vertex Oxamolybdaboranes: Structural Characterizations of (η^5 -C₅Me₅Mo) 2B₅ (μ^3 -OEt) H₆R (R= H and n-BuO). *Organometallics*, 28(5), 1586-1589. **(IF = 4.253)**
17. Dhayal, R. S., Chakrahari, K. K. V., Ramkumar, V., & Ghosh, S. (2009). B-Alkylation and Arylation of [(η^5 -C₅Me₅Mo) 2B₅H₉]: Synthesis and Characterization of Isomeric [(η^5 -C₅Me₅Mo) 2B₅H₉-nRn] (When R= n-Bu, n= 2, 1; R= Ph, n= 2, 1). *Journal of Cluster Science*, 20(3), 565-572. **(IF = 1.356)**
18. Dhayal, R. S., Sahoo, S., Ramkumar, V., & Ghosh, S. (2009). Substitution at boron in molybdaborane frameworks: Synthesis and characterization of isomeric (η^5 -C₅Me₅Mo) 2B₅H_nX_m (when X= Cl: n= 5, 7, 8; m= 4, 2, 1 and X= Me: n= 6, 7; m= 3, 2). *Journal of Organometallic Chemistry*, 694(2), 237-243. **(IF = 2.302)**

Book Chapters

Review Articles

19. Polyhydrido Copper Clusters: Synthetic Advances, Structural Diversity and Nanocluster-to-Nanoparticles Conversion, Rajendra S. Dhayal, Werner E. van Zyl and C. W. Liu, *Acc. Chem., Res.* **2015**, DOI: 10.1021/acs.accounts.5b00375 **(IF = 22.232)**

Popular Articles

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, Chinese Puzzle Molecule: A Fifteen Hydride, 28 Copper Nanoball, *Angew. Chem. Int. Ed.* **2014**, 53, 7214 **(Selected for Front cover page of Journal and became hottest article in Inorganic Chemistry)**. **(IF = 11.33)**

Press Releases on My Research

<http://www.ansto.gov.au/AboutANSTO/News/ACS051619>

New molecule puts scientists a step closer to understanding hydrogen storage –

Seemoret:<http://www.ansto.gov.au/AboutANSTO/News/ACS051619#sthash.6SKzGNyU.dpuf>
<http://nsrrc.com/neutron/modules/tadnews/index.php?ncsn=1>

Monographs

Technical Reports

Workshop/Conferences

Organised

Attended

1. (RhCl(PNp₃)₃, tri-1-naphthylphosphine complex of Ruthenium(II) as regioselective catalyst for hydrogenation of alkenes, (Indian Chemical Society), University Vadodara, Vadodara, Jan. 2006. India.
2. Chlorinated Hypoelectronic Dimetallaborane Clusters: Synthesis, Characterization and Electronic Structures of (η^5 -C₅Me₅W)₂B₅H_nCl_m (n = 7, m = 2 and n = 8, m = 1). *Modern Trends in Inorganic Chemistry-XII*, Dec., 2007, IIT Madras, India.
3. Unusual Open Eight-Vertex Oxamolybdaboranes: Structural Characterizations of (η^5 -C₅Me₅Mo)₂B₅(μ_3 -OEt)H₆R (R = H and *n*-BuO). *11th CRSI national Symposium in Chemistry*, NCL, Feb., 2009, Pune, India
4. Hydrido Copper (1) clusters stabilized by diselenocarbamate ligands. Annual Meeting of Chemical Society, National Cheng Kung University(NCKU), Tainan. Dec., 2012, Taiwan.
5. Nanosized Copper Polyhydrido cluster:[Cu₃₂(H)₂₀{S₂P(O²Bu)₁₂}. Annual Meeting of Chemical Society, NTHU, Nov., 2013, Taiwan.
6. Vertex-Fused Metallaborane Clusters: Synthesis, Characterization and Electronic Structure of [(η^5 -C₅Me₅Mo)₃MoB₉H₁₈]. *Inorganic Ring Systems-12*, August, 2009, Goa, India.
7. Synthesis of a New class of Open-Cage Dimolybdaheteroborane Clusters, *Inaugurated conference on molecular and functional catalysis (ICMFC)-1*, National University Singapore, July, 2010, Singapore.
8. Solar H₂ Evolution from Polyhydrido Copper Nanoclusters and Complete Reduction of Hydrido Clusters by Borohydride: Formation of Rhombus-Shaped Copper Nanoparticles. The 11th Taiwan-U.S. Air Force Nanoscience Program Review & Workshop, May (13-15th), 2014, NDHU, Hualien, Taiwan.
9. [Cu₃₂(H)₂₀{S₂P(OⁱPr)₂}]₁₂: The Largest Number of Hydrides Recorded on A Molecular Metal Cluster by Neutron Diffraction, *Frontiers at the Chemistry-Allied Sciences Interface (FCASI-2015)*, Univ. of Rajasthan. March(13-14th), 2015.

Research Grants

35 Lakh, DST Start-Up Research Grant (Young Scientists),

Other Achievements

Collaboration