

Curriculum Vitae

Dr. Yuvaraj K

Assistant Professor,
Department of Chemistry,
Indian Institute of Technology Palakkad,
Kanjikode | Palakkad | Kerala – 678623
Email: yuvaraj@iitpkd.ac.in



Education Details

- 2012-2017: Ph.D. in Chemistry, Indian Institute of Technology Madras, India.
2008-2010: MSc in Chemistry, St. Joseph's College, Bharathidasan University, Tamil Nadu, India.
2005-2008: BSc in Chemistry (Major), Gobi Arts and Science College, Bharathiyar University, Coimbatore, Tamil Nadu, India.

Doctoral Details

- *Dissertation:* **Chemistry of Diruthenium Analogues of Tetraborane(10) and Pentaborane(9)**
- *Supervisor:* **Prof. Sundargopal Ghosh**, Indian Institute of Technology Madras, India.

Professional Details

[Feb 2023-Present] **Assistant Professor** at Indian Institute of Technology Palakkad, Kerala, India.

[Jan 2019-Jan 2023] **Post-Doctoral Fellow** with Prof. Cameron Jones, Monash University, Australia.

[Jan 2018-Dec 2018] **SERB- Overseas Post-Doctoral Fellowship (O-PDF)** with Prof. Cameron Jones, Monash University, Australia.

[Nov 2016-May 2017] **Institute Pre-Doctoral Fellow** with Prof. Sundargopal Ghosh, Indian Institute of Technology Madras, India.

Awards and Honors

- “Best poster prize” in IC 21 Virtual RACI Inorganic Chemistry Division Conference, 2021, Australia.
- “Best poster prize” in 12th Australasian Organometallics Meeting OZOM12, 2019, Australia.
- SERB- Overseas Post-Doctoral Fellowship (O-PDF), India, 2016-17.
- SERB- National Post-Doctoral Fellowship (N-PDF), India, 2017.
- Senior Research Fellowship (SRF-CSIR), CSIR-UGC, India, 2014.
- Junior Research Fellowship (JRF-CSIR), CSIR-UGC, India, 2012.
- Graduate Aptitude Test in Engineering (GATE), India, 2012.
- “Gold medal” in MSc chemistry during the year 2008-2010.

List of Publications

1. Stabilization and One Electron Reduction of a Silicon Analogue of a Carboxylic Acid Anhydride. Y. Jiang, **K. Yuvaraj**, T. Rajeshkumar, L. F. Lim, N. Cox, L. Maron and C. Jones, *Chem. Eur. J.* **2023**, e202303949, (<https://doi.org/10.1002/chem.202303949>). (Selected as **Very Important Paper**).
2. Reductive Metallation of Dendralenes and Myrcene using Dimagnesium(I) Compounds: A Facile Route to Unsaturated Organomagnesium Compounds, J. C Mullins, **K. Yuvaraj**, M. J. Sowden, M. S. Sherburn and C. Jones, *Chem. Eur. J.* **2023**, e202303219. (<https://doi.org/10.1002/chem.202303219>). (Selected as **Hot Paper**).
3. Magnesium(I) Reduction of Aluminum(III) Hydride Complexes: Generation of Mixed Valence Aluminum (Al^I/Al⁰) Hydride Cluster Compounds, [Al₆H₈(NR₃)₂{Mg(β-diketiminato)}₄]. S. Mullassery, **K. Yuvaraj**, D. Dange, D. D. L. Jones, I. D. Rosal, R. O. Piltz, A. J. Edwards, L. Maron and C. Jones, *Angew. Chem. Int. Ed.* **2023**, e202305582 and preprint available ([10.26434/chemrxiv-2023-l84np-v2](https://doi.org/10.26434/chemrxiv-2023-l84np-v2)).
4. Molybdenum Carbonyl Assisted Reductive Tetramerization of CO by Activated Magnesium(I) Compounds: Squarate Dianion vs. Metallo-Ketene Formation. **K. Yuvaraj**, J. C. Mullins, T. Rajeshkumar, I. Douair, L. Maron and C. Jones, *Chem. Sci.* **2023**, 14, 5188. (<https://doi.org/10.1039/D3SC01487H>).
5. Ketyl Radicals Generated from Magnesium(I) Compounds: Useful Reagents for C–C Bond Forming Reactions. C. A. Rosengarten, **K. Yuvaraj**, L. F. Lim, N. Cox and C. Jones, *Chem. Eur. J.* **2023**, e202300135, (<https://doi.org/10.1002/chem.202300135>).

6. Reductive Activation of N₂ using a Calcium/Potassium Bimetallic System Supported by an Extremely Bulky Diamide Ligand. R. Mondal, [K. Yuvaraj](#), T. Rajeshkumar, L. Maron and C. Jones, *Chem. Comm.* **2022**, 58, 12665. (**Hot Article**)
7. C–H Activation of Inert Arenes using a Photochemically Activated Guanidinato-Magnesium(I) Compound. J. C. Mullins[#], [K. Yuvaraj](#)[#], Y. Jiang, G. P. Trieste III, A. Maity, D. C. Powers and C. Jones, *Chem. Eur. J.* **2022**, e202202103. (#Equal contribution).
8. Activation of CO using a 1,2-Disilylene: Facile Synthesis of an Abnormal N-Heterocyclic Silylene. P. Garg, A. Carpentier, I. Douair, D. Dange, Y. Jiang, [K. Yuvaraj](#), L. Maron and C. Jones, *Angew. Chem. Int. Ed.* **2022**, 134, e202201705.
Highlighted in *Chemistry in Australia*.
9. Magnesium(I) Reduction of CO and N₂ Complexes of Cummin's Molybdenum(III) Tris(anilide), [Mo(L){N(Ar')Bu^t}₃] (L = CO or N₂; Ar' = 3,5-dimethylphenyl). [K. Yuvaraj](#), A. Paparo, A. J. R. Matthews and C. Jones, *Eur. J. Inorg. Chem.* **2021**, 4998, (Selected as **Very Important Paper**).
(Invited submission for the EJIC/ChemCatChem joint special collection on Main Group Catalysis).
10. Reductive Coupling of CO with Magnesium Anthracene Complexes: Formation of Magnesium Enediolates. [K. Yuvaraj](#) and C. Jones, *Chem. Comm.* **2021**, 57, 9224.
11. N-Heterocyclic Carbene, Carbodiphosphorane and Diphosphine Adducts of Beryllium Dihalides: Synthesis, Characterisation and Reduction Studies. A. Paparo, A. J. R. Matthews, C. D. Smith, A. J. Edwards, [K. Yuvaraj](#) and C. Jones, *Dalton Trans.* **2021**, 50, 7604.
12. C–N and C–H Activation of an N-Heterocyclic Carbene by Magnesium(II) Hydride and Magnesium(I) Complexes. [K. Yuvaraj](#), A. Carpenter, C. D. Smith, L. Maron and C. Jones, *Inorg. Chem.* **2021**, 60, 6065.
13. Reductive Hexamerization of CO Involving Cooperativity Between Magnesium(I) Reductants and [Mo(CO)₆]: Synthesis of Well-Defined Magnesium Benzenehexolate Complexes. A. Paparo[#], [K. Yuvaraj](#)[#], A. J. R. Matthews, I. Douair, L. Maron and C. Jones, *Angew. Chem. Int. Ed.* **2021**, 60, 630. (#Equal contribution), (Selected as **Hot Paper**).
Highlighted in *Chemistry Views*, *NNNS Chemistry blog* and *Chemistry in Australia*.

14. Reduction of a 1,4-Diazabutadiene and 2,2'-Bipyridine using Magnesium(I) Compounds. [K. Yuvaraj](#) and C. Jones, *Main Group Met. Chem.* **2020**, *43*, 177.
15. Activation of Ethylene by N-Heterocyclic Carbene Coordinated Magnesium(I) Compounds. [K. Yuvaraj](#), I. Douair, L. Maron and C. Jones, *Chem. Eur. J.* **2020**, *26*, 14665. (Selected as **Hot Paper**).
16. Sterically Controlled Reductive Oligomerisations of CO by Activated Magnesium(I) Compounds: Deltate vs. Ethenediolate Formation. [K. Yuvaraj](#), I. Douair, D. D. L. Jones, L. Maron and C. Jones, *Chem. Sci.* **2020**, *11*, 3516.
17. Neutral, Anionic and Paramagnetic 1,3,2-Diazaberyllacycles Derived from Reduced 1,4-Diazabutadienes. A. Paparo, S. Best, [K. Yuvaraj](#) and C. Jones, *Organometallics* **2020**, *39*, 4208. (Special Issue: Organometallic Chemistry of the Main-Group Elements).
18. Synthesis and Reactivity of Boryl Substituted Silaimines. [K. Yuvaraj](#) and C. Jones, *Dalton Trans.* **2019**, *48*, 11961.
19. Reductive Trimerization of CO to the Deltate Dianion using Activated Magnesium(I) Compounds. [K. Yuvaraj](#), I. Douair, A. Paparo, L. Maron and C. Jones, *J. Am. Chem. Soc.* **2019**, *141*, 8764.
Highlighted in *Chemistry in Australia*.
20. Metal-rich Metallaboranes: Structures and Geometries of Heterometallic μ_9 -Boride Clusters. M. Bhattacharyya, [K. Yuvaraj](#), A. Chanda, V. Ramkumar and S. Ghosh, *Eur. J. Inorg. Chem.* **2018**, 2574.
21. Synthesis, Structure and Chemistry of Mono- and Digallane Complexes Supported by N,O-Ketimine Ligand. K. Bakthavachalam, [K. Yuvaraj](#), K. Raghavendra, V. Dorcet, T. Roisnel, A. Rit and S. Ghosh, *Chemistry Select* **2017**, *2*, 7450.
22. Reactivity of $[M_2(\mu\text{-Cl})_2(\text{cod})_2]$ (M = Ir, Rh) and $[\text{Ru}(\text{Cl})_2(\text{cod})(\text{CH}_3\text{CN})_2]$ with $\text{Na}[\text{H}_2\text{B}(\text{bt})_2]$: Formation of Agostic versus Borate Complexes. K. Bakthavachalam, [K. Yuvaraj](#), M. Zafar and S. Ghosh, *Chem. Eur. J.* **2016**, *22*, 17291.
23. Reactivity of CS_2^- Syntheses and Structures of Transition-metal Species with Dithioformate and Methanedithiolate Ligands. C. E. Rao, S. K. Barik, [K. Yuvaraj](#), K. Bakthavachalam, T. Roisnel, V. Dorcet, J-F. Halet and S. Ghosh, *Eur. J. Inorg. Chem.* **2016**, 4913.
24. New Trinuclear Complexes of Group 6, 8, and 9 Metals with a Triply Bridging Borylene Ligand. [K. Yuvaraj](#), M. Bhattacharyya, R. Prakash, V. Ramkumar and S. Ghosh, *Chem. Eur. J.* **2016**, *22*, 8889.

25. Chemistry of Rh-N,S heterocyclic Carbene Complexes. D. K. Roy, [K. Yuvaraj](#), R. Jagan and S. Ghosh, *J. Organomet. Chem.* **2016**, 811, 8.
26. Electron-Precise 1,3-Bishomocubanes- A Combined Experimental and Theoretical Study. S. K. Barik, C. E. Rao, [K. Yuvaraj](#), R. Jagan, S. Kahlal, J-F Halet and S. Ghosh, *Eur. J. Inorg. Chem.* **2015**, 5556.
27. All-Metallagermoxane with an Adamantanoid Cage Structure: $[(\text{Cp}^*\text{Ru}(\text{CO})_2\text{Ge})_4(\mu\text{-O})_6]$ ($\text{Cp}^* = \eta^5\text{-C}_5\text{Me}_5$). K. Bakthavachalam, [K. Yuvaraj](#), B. Mondal, R. Prakash and S. Ghosh, *Dalton Trans.* **2015**, 44, 17920.
28. Homometallic Cubane Clusters: Participation of Three-Coordinated Hydrogen in 60-Valence Electron Cubane Core. [K. Yuvaraj](#), D. K. Roy, B. Mondal, B. Varghese and S. Ghosh, *Inorg. Chem.* **2015**, 54, 8673.
29. Diruthenium Analogues of Hexaborane(12) and Pentaborane(9): Synthesis and Structural Characterization of $[(1,2\text{-Cp}^*\text{Ru})_2\text{B}_2\text{H}_6\text{S}_2]$ and $[(2,3\text{-Cp}^*\text{Ru})_2\text{B}_3\text{H}_6(\mu\text{-}\eta^1\text{-EPh})]$, (E = S, Se and Te) ($\text{Cp}^* = \eta^5\text{-C}_5\text{Me}_5$). C. E. Rao, [K. Yuvaraj](#) and S. Ghosh, *J. Organomet. Chem.* **2015**, 776, 123.
30. Chemistry of Early and Late Transition Metallaboranes: Synthesis and Structural Characterization of Periodinated Dimolybdaborane $[(\text{Cp}^*\text{Mo})_2\text{B}_4\text{H}_3\text{I}_5]$. [K. Yuvaraj](#), D. K. Roy, C. Arivazhagan, B. Mondal and S. Ghosh, *Pure Appl. Chem.* **2015**, 87, 195.
31. Mixed-Metal Chalcogenide Tetrahedral Clusters with an Exo-polyhedral Metal Fragment. [K. Yuvaraj](#), D. K. Roy, V. P. Anju, B. Mondal, B. Varghese and S. Ghosh, *Dalton Trans.* **2014**, 43, 17184.
32. Reactivity of Diruthenium and Dirhodium Analogues of Pentaborane(9): Agostic versus Boratrane Complexes. R. S. Anju, D. K. Roy, B. Mondal, [K. Yuvaraj](#), C. Arivazhagan, K. Saha, B. Varghese and S. Ghosh, *Angew. Chem. Int. Ed.* **2014**, 53, 2873.
33. New Heteronuclear Bridged Borylene Complexes That Where Derived from $[\text{Cp}^*\text{CoCl}]_2$ and Mono-Metal-Carbonyl Fragments. D. Sharmila, [K. Yuvaraj](#), S. K. Barik, D. K. Roy, K. K. Chakrahari, R. Ramalakshmi, B. Mondal, B. Varghese and S. Ghosh, *Chem. Eur. J.* **2013**, 19, 15219.
34. Chemistry of Homo- and Heterometallic Bridged-Borylene Complexes. [K. Yuvaraj](#), D. K. Roy, K. Geetharani, B. Mondal, V. P. Anju, P. Shankhari, V. Ramkumar and S. Ghosh, *Organometallics* **2013**, 32, 2705.
35. Syntheses and Characterization of New Vinyl-Borylene Complexes by the Hydroboration of Alkynes with $[(\mu_3\text{-BH})(\text{Cp}^*\text{RuCO})_2(\mu\text{-CO})\text{Fe}(\text{CO})_3]$. S. K. Bose, D.

K. Roy, P. Shankhari, [K. Yuvaraj](#), B. Mondal, A. Sikder and S. Ghosh, *Chem. Eur. J.* **2013**, *19*, 2337.

Seminars/ Conference Participated

1. Reductive Homologation of CO by Activated Magnesium(I) Reductants: Reactivity of Lewis base Adducts vs $[\text{Mo}(\text{CO})_6]$. [K. Yuvaraj](#), A. Paparo, I. Douair, L. Maron and C. Jones. International Conference on Main Group Synthesis and Catalysis (ICMGSC), 9-12 February **2023**, Jointly Organised by IISER Thiruvananthapuram and Royal Society of Chemistry, Kerala, India.
2. Reductive Trimerization of CO to the Deltate Dianion using Activated Magnesium(I) Compounds. [K. Yuvaraj](#), I. Douair, A. Paparo, L. Maron and C. Jones. RACI Victorian Inorganic Symposium, 25th November **2022**, Swinburne University of Technology, Australia.
3. Reductive Homologation of CO by Activated Magnesium(I) Reductants: Reactivity of Lewis base Adducts vs $[\text{Mo}(\text{CO})_6]$. [K. Yuvaraj](#), A. Paparo, I. Douair, L. Maron and C. Jones. OZOM13, 13th Australasian Organometallics Meeting 11th–14th July 2022, Cairns, Queensland, Australia.
4. Reductive Homologation of CO by Activated Magnesium(I) Reductants: Reactivity of Lewis base Adducts vs Catalytic $[\text{Mo}(\text{CO})_6]$. [K. Yuvaraj](#), A. Paparo, I. Douair, L. Maron and C. Jones. 6th–8th July 2021, IC 21 Virtual RACI Inorganic Chemistry Division Conference, Australia (**Best poster prize**).
5. Reductive Trimerization of CO to the Deltate Dianion using Activated Magnesium(I) Compounds. [K. Yuvaraj](#), I. Douair, A. Paparo, L. Maron and C. Jones. OZOM12 12th Australasian Organometallics Meeting, July 9-12, 2019, Melbourne, Australia (**Best poster prize**).
6. Low-Valent NHC-Coordinated Mg(I)-Dimers for Small Molecule Activation. [K. Yuvaraj](#) and C. Jones. RACI Victorian Inorganic Symposium, 30th November **2018**, Monash University, Australia.
7. The Modern Trends in Inorganic Chemistry (MTIC)-**XVII**, 11-14 December, **2017**, jointly hosted by NCL-Pune, IISER-Pune, and SP Pune University-Pune, India.
8. Eight Membered Dimetallaheterocycles: Main Group-Transition Metal Analogues of 1,5-Cyclooctadiene. [K. Yuvaraj](#), V. Ramkumar and S. Ghosh. Chemistry in-house

symposium (CiHS-2016), August 17th, 2016, Department of Chemistry, IIT Madras, Chennai, India.

9. Eight Membered Dimetallaheterocycles: Main Group-Transition Metal Analogues of 1,5-Cyclooctadiene. **K. Yuvaraj**, V. Ramkumar and S. Ghosh. Boron in the Americas meeting (Boram XV), June 25th –28th, 2016, Queen's University, Kingston, Ontario.
10. Syntheses and Characterization of Novel Vinyl-Borylene Complexes by the Hydroboration of Alkynes with $[(\mu_3\text{-BH})(\text{Cp}^*\text{RuCO})_2(\mu\text{-CO})\text{Fe}(\text{CO})_3]$ ($\text{Cp}^* = \eta^5\text{-C}_5\text{Me}_5$). **K. Yuvaraj**, A. Sikder and S. Ghosh. Chennai Chemistry Conference (CCC), 8-10 February, 2013, CLRI, Chennai, India.
11. Syntheses and Characterization of Novel Vinyl-Borylene Complexes by the Hydroboration of Alkynes with $[(\mu_3\text{-BH})(\text{Cp}^*\text{RuCO})_2(\mu\text{-CO})\text{Fe}(\text{CO})_3]$ ($\text{Cp}^* = \eta^5\text{-C}_5\text{Me}_5$). **K. Yuvaraj**, A. Sikder and S. Ghosh. New Directions in Chemical Sciences (NDCS), 7-9 December, 2012, IIT Delhi, New Delhi, India.
12. Summer training program in chemistry -2009 (STPIC) from 25-5-2009 to 13-6-2009, Department of chemistry, University of Madras, Sponsored by Science city, Department of higher education, Government of Tamilnadu.

Invited Lectures/ Scientific Presentations

1. 'Reductive Homologation of CO by Activated Magnesium(I) Reductants', Invited Lecture, 3rd International Conference on Main Group Molecules to Materials (MMM-3), IIT Hyderabad & University of Hyderabad, India, 9-11 December 2023.
2. 'Revolution of Modern Main Group Chemistry', Invited Lecture, UGC Sponsored National Seminar on 'Frontiers in Chemical Sciences', PG & Research Department of Chemistry, Gobi Arts and Science College, Gobichettipalayam, Tamilnadu, 10th March 2023.

Experimental Skills

- Single crystal X-ray diffractometer (Oxford XtaLAB Synergy-S) (four-year experience)
- Synchrotron MX1 and MX2 beam lines for single crystals (Five-year experience)
- Structure solution and modelling disorder of the single crystal X-ray data by using X-seed and Olex2 programs.
- FT-NMR spectrometer (Bruker Avance III 400 and 600 MHz)

- GC/MS analyses (Agilent 6890 GC)
- FT-IR (**Jasco, Agilent Cary 630**)
- Cyclic voltammetry (**CH instruments**)
- UV-Vis spectrophotometer (**Jasco V-650, Evolution 300-Thermoscientific**)
- Standard Schlenk line and glove-box techniques for inert atmosphere reactions
- Vacuum distillation and sublimation.