Department of Chemistry, IIT Madras
Ph.D. Colloquium Seminar

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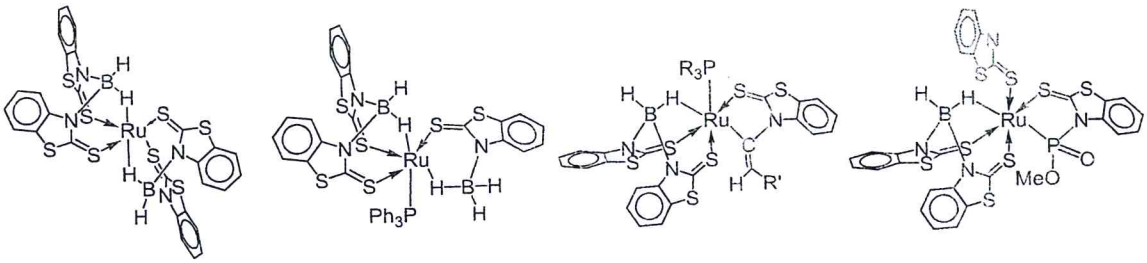
Venue: CB310

Date: 09.10.2019

Time: 4:15 p.m.

Synthesis, structure and chemistry of ruthenium agostic borate complexes

Transition metal complexes having an [M]····H-B interaction, sigma or agostic played an important role in various metal-catalyzed B-H activation and hydroboration processes.[1-2] Two types of [M]····H-B bonding motifs have been recognized, one is base-stabilized [2] and other is base free [M]····H-B bonding.[3] In general, these interactions are mostly stimulated by ligand design, such as, bis and tris(pyrazolyl)borate ligands. As a result, synthesis and characterization of ruthenium borate complexes having [M]····H-B interactions became of interest. In this context, we have synthesized and structurally characterized ruthenium bis(mercaptobenzothiazolyl/mercaptopyridyl)borate complexes, featuring dual [M]···H-B interactions between Ru and B-H bonds of $[H_2B(mbz)_2]^-$ or $[H_2B(mp)_2]^-$ (mbz = 2-mercaptobenzothiazolyl; mp = 2-mercaptopyridyl). These complexes promptly react with various phosphorus-based ligands leading to the generation of novel coordinated metal-boron complexes. The reaction also led to the formation of ruthenium borate complexes that are stabilized by δ-B-H interactions along with one phosphine or phosphite ligand. These borate complexes activate the small molecules like terminal alkynes, boranes, silanes and phosphite and the formation of five membered ruthenacycles. The key results of this work will be described.



References:

[1] (a) G. Kubas, *Metal Dihydrogen and σ-Bond Complexes*, Kluwer Academic/Plenum Publishers, New York, **2001**. (b) M. Brookhart, G. Parkin *Proc. Natl. Acad. Sci. U.S.A*, **2007**, *104*, 6908.

[2] M. Shimoi, S. Nagai, Y. Kawano, M. Katoh, *J. Am. Chem. Soc.* **1999**, *121*, 11704.

[3] (a) M. Zafar, R. Ramalakshmi, K. Pathak, A. Ahmad, T. Roisnel, S. Ghosh *Chem. Eur. J.*, **2019.** (b) M. Zafar, R. Ramalakshmi, A. N. Pradhan, K. Pathak, T. Roisnel, J-F. Halet and S. Ghosh, *Dalton Trans.*, **2019**,*48*, 7413-7424. (c) M. Zafar, A. Ahmad, R. Ramalakshmi, S. Ghosh (*manuscript under preparation*). R (d) K. Bakthavachalam, K. Yuvaraj, M. Zafar, S. Ghosh, *Chem. Eur. J.*, **2016**, *22*, 17291. (e) G. Alcaraz, E. Clot, S Sabo-Etienne, *J. Am. Chem. Soc.* **2007**, *129*, 8704. (f) S Anju, D. K Roy, B. Mondal, S. Ghosh, *Angew. Chem. Int. Ed.* **2014**, *53*, 2873.

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1 Oct '2019

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