Tata Institute of Fundamental Research
Survey No. 36/P, Gopanpally Village, Serilingampally, Ranga Reddy Dist., Hyderabad – 500 046

Internal Webinar

Group 14 metal complexes supported by Imino-phosphanamidinate ligands as a precursor for the catalytic applications of small molecules

Gobbilla Sai Kumar

IIT, Hyderabad

Nitrogen-based ligands showed enormous applications in stabilising the main group metals, which paved the way for their applications in catalysis. Further, the utilisation of appropriate nitrogen donor ligands can be considered as an alternative for cyclopentadienyl ligands. Electron-rich ligands such as iminophosphonamide, guanidinates, amidinates and boraamidinates are stabilising the wide range of metal complexes across the periodic table. Since the discovery of Imidazolin-2-iminato ligand by Tamm et.al, it has the ability to stabilise the positive charge that leads to highly basic ligands. Due to this, the Imidazolin-2-iminato ligand is effective in stabilising different metal complexes. The stabilisation of group 13 and group 16 metal complexes was demonstrated by several groups owing to imidazolin-2-iminato ligand's exceptional electron-donating ability. In search of this, Chandrasekhar et.al. demonstrated the synthesis of Imino-phosphonamide ligand in which phosphorous centre would be in an oxidation centre +3 which can act as amidinate based ligand for binding different metal complexes. Further, it has ability for tuning the aryl groups on the nitrogen centre as well as phosphorous centre. Here, the utilisation of Imino-phosphonamide ligand for the synthesis of yttrium metal complex [{NHIRP(Ph)N-Dipp}Y{$NSiMe_3$}$_2$] (iPr, Me) for the hydroboration of carbonyl compounds. Later, the same group also developed aluminium alkyl metal complexes as a catalyst for the hydroamination/guanylation reaction of carbodiimides at room temperature. Further, the same group also developed imino-phosphanamidinate chalcogenide ligands towards alkyl aluminium complex as a catalyst for the hydroboration of nitriles, alkenes and alkynes. Owing the versatile nature of this Imino-phosphanamide ligand for stabilising main group metal complexes, we want to explore its ability for the synthesis of low valent metal complexes such as Silicon (Si), Germanium (Ge), Tin (Sn) and their catalytic applications as small molecule activation and reduction of different functional groups.

Wednesday, Apr 24th 2024

15:30 Hrs