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

Internal Webinar

Pd, Ru, Mg – Complexes for CO_2 Utilisation, Cross-coupling/Transfer-hydrogenation Reactions: Base-Mediated Synthesis of Isothiazole

Sushanta Kumar Meher

NISER, Bhubaneswar

The chemical conversion of carbon dioxide (CO_2) into useful organic compounds has received considerable attention as it represents an abundant, inexpensive, and nontoxic C1 source. Coupling reactions of CO_2 with epoxides/aziridines to produce cyclic carbonates/oxazolidinones as valuable chemicals under mild conditions is an important and attractive method for utilising carbon dioxide.

An important aspect of efficient catalysis is combining multiple (at least two) mechanistically distinct reactions (tandem reactions) in one-pot. This process offers several advantages in terms of atom economy, number of steps involved, consumption of energy, and reduction of chemical waste. Incorporating multiple metal centres into a single molecular framework offers several advantages in terms of improved or new properties and activity as compared to their mono- and dimetallic analogues. This system brings the active centres closer, thereby exhibiting synergistic or cooperative interaction and increasing catalytic activity.

Isothiazoles are an important family of five-membered heterocycles that received growing interest owing to their biomedical, agricultural and industrial activities. Wide applications of isothiazoles stimulated researchers to identify and develop different synthetic pathways to make isothiazoles. Although considerable progress has been made, the development of simple and efficient protocols for the synthesis of substituted isothiazoles is always in demand.

In this seminar, I will discuss the synthesis, characterisation, and uses of Pd, Ru, and Mg complexes for CO_2 cycloaddition and tandem reactions. I will also discuss a simple general synthetic method for substituted isothiazoles.

Monday, Nov 24th 2025

11:30 Hrs