

# UniSysCat Special Lecture

Moumita Majumdar

Indian Institute of Science Education Research, Pune, India

Start Time: Thursday, June 13, 2019 05:15 pm

End Time: Thursday, June 13, 2019 06:45 am

Villa Bell, BEL 301

Technische Universität Berlin, Marchstrasse 6, 10587 Berlin

## Genial Germanium and Tin Tweaks for Catalytic and Energy Applications

In recent times molecular chemists have been intrigued by the structural and bonding motifs of low-valent main group elements. Worth mentioning, low-valent Group 14 elements have flourished with many outstanding applications in catalysis, polymer and electronic industry etc. Low-valent germanium and tin are the workhorse of our current research.

We have established a nucleophilic Ge(II) dication, where the positively charged Ge(II) center directly coordinates to transition metal centers such as Ag(I), Au(I). Such metal complexes stabilized with cationic ligands show strong implications in Lewis acid catalysis. The analogous tin(II) dication however does not exhibit nucleophilic behavior. Interestingly, it undergoes a transmetallation reaction with GeCl<sub>2</sub>.dioxane. We have also stabilized a handful of bis(chlorogermylumylidene)s circumventing the probable electrostatic impairments associated with multiple cationic sites. In the case of bis( $\pi$ -iminopyridine) stabilized bis(chlorogermylumylidene), the two [ $\text{GeCl}$ ]<sup>+</sup> units proved conducive for reductive cyclization of the bis( $\alpha$ -iminopyridine). Our recent results in (poly)cationic E(II) (E = Ge, Sn) chemistry will be discussed. Furthermore, the role of redox-active multi-dentate ligands in the stabilization of polystannylenes and tris(stannylenyl)amine and their further reactivity will be discussed.

The high-energy-density rechargeable batteries which is the current global demand, can be achieved by utilizing anode materials with higher specific capacities than the commercially available ones. Our group has developed germanium nano-composite that shows good specific capacity and cycling performances. The molecular approach to solving problems in such energy applications will be discussed.

Prof. Drieß (Organizer)

