

Colloquium

Unsaturated Maingroup Species: Beyond the Carbon Copy

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Heavier double bonds attracted enormous interest since more than a century. Early attempts to synthesize stable species with such double bonds exclusively resulted in oligo- or polymeric materials despite occasional claims to the contrary. As a consequence, the classical "double bond rule" surmised that double bonds between two elements beyond the 2nd row of the periodic table would be unstable. The search for exceptions to this rule and thus for parallels to carbon chemistry was on and finally successful with the isolation of stable compounds with formal Ge=Ge, Sn=Sn, Si=Si, and P=P units in the late 1970s and early 1980s. The first 20 years of research in this area focused on the structural peculiarities and the reactivity of the heavier alkene analogues and to this day enormous efforts are devoted to mimic the hallmarks of C=C bonds in organic chemistry such as conjugation and functional group tolerance.

As a deeper understanding of the theoretical foundations of the peculiar bonding in heavier maingroup elements, an additional focus has been directed to the differences rather than the similarities between the first two rows and the rest of the periodic table. In unsaturated systems in particular, a strong preference for cluster-like arrangements has become obvious, increasingly so as the number of cluster vertices and the degree of unsaturation rises. The unique structure and electronic properties of unsaturated clusters of the heavier maingroup elements reflect those of the corresponding nanomaterials and bulk surfaces, which potentially opens a wide field of application, e.g. in photovoltaics, microprocessors or data storage.

Monday, Feb 18th 2019

4:00 PM (Tea/Coffee at 3:30 PM)

Auditorium, TIFR-H