Animesh Chakravorty

Animesh Chakravorty is in the Department of Inorganic Chemistry at the Indian Association for the Cultivation of Science, Kolkata. He obtained his Ph D from Calcutta University. He worked as a research associate at MIT and Harvard University. Later he become a Professor and Head of the Department of Chemistry at the Indian Institute of Technology, Kanpur.

Excerpts from his interview*

How has the field of inorganic chemistry evolved over the years?

Inorganic chemistry encompasses the chemistry of all elements, including a good part of carbon chemistry. Unification of this vast and apparently heterogeneous area under one roof needed the arrival of relatively mature ideas of chemical bonding, structure and reactivity as well as of new experimental tools and physical methods. In this context, the 1950s have been called the renaissance period of modern inorganic chemistry. There has been no looking back after that.

A long march of progress and discoveries shaped and reshaped inorganic chemistry. One could clearly see the emergence of two major players – bioinorganic chemistry and inorganic materials chemistry, which now occupy centrestage along with the ever-important inorganic synthesis and reactivity.

An element of heterogeneity is ingrained in the very nature of inorganic chemistry because of its inherent interdisciplinary nature. Inorganic chemists have to tread freely in the domains of theory and computation, spectroscopy, crystallography, biology, physics, materials science and others. To my mind, today's inorganic chemistry is an epitome of unity in diversity.

What do you see as things that have changed in the field?

In the case of new compounds one now invariably needs detailed structural characterization before one can proceed any further. Newness alone is no longer a cutting edge. Does it illustrate something special or does it connect to a broader problem (say relating to life or materials), or does it display unusual reactivity? In brief, things have to be more purposeful than before. This change has been powered to a considerable extent by the advances in available experimental and computational tools.

What do you think lies in the future for inorganic chemistry?

With virtually the whole of the periodic table in their arsenal, inorganic chemists will remain endlessly busy with the synthesis and study of new and unusual molecules and materials while relating them to chemical principles, to the chemistry of life and to utilization in human welfare, and more.

Coming to specifics, one can expect developments in useful molecular inorganic materials functioning as magnets, machines, sensors, switches, memory devices and the like. To achieve viable water splitting or to capture solar energy in an efficient manner via molecules is the dream of inorganic chemists. Much remains to be done here. We expect future inorganic chemists to come up with many new and environment-friendly enzyme-like catalysts. There has been significant activity in inorganic drug research. While the number of compounds that have achieved drug status like cisplatin is quite small so far, there is much scope for activities here. Inorganic chemists will continue to play a major role in the development of better imaging and contrasting agents, and in the understanding and alleviation of metal-related neurodegenerative diseases.

Where does inorganic chemistry stand relative to other areas of chemistry?

In most countries, including our own, the organic chemistry community is larger than the other communities. I presume that this also reflected in number of researchers and publications. Inorganic chemists have won fewer Nobel Prizes than others.

How has computation changed the way research in inorganic chemistry is carried out?

The availability of large computation capabilities has much influenced inorganic chemistry as it has all other branches. Computation of structure, various properties and reactivity provides a powerful tool for putting theoretical predictions side-by-side to experimental findings providing rationales and new directions of future activity.

What kind of prospects do young inorganic chemists have?

In our country, the academia with its network of universities, institutes and research laboratories provides many opportunities to young people interested in teaching and research. With more such organizations coming up and with the large escalation of available funding, I expect that the quality and quantity of new inorganic chemistry generated by them will keep attaining higher and higher altitudes internationally. The inorganic chemical industry and its research laboratories (at present limited in number) also provide significant opportunities. A higher industry–academia synergy that is extant now is much needed. This will create new opportunities and challenges for the young.

The boundaries in different disciplines of science are blurring and at the same time there is increased specialization...

Melting of boundaries and crystallization of sub-divisions are part of the evolution of science as more information and discoveries accumulate. The checks and balances of this dynamic process are in-built. To cite big examples: physics helped chemistry to stand upright and chemistry did the same to biology. Much instrumentation came out of physics. Chemical engineering and metallurgy similarly relate to chemistry as does biotechnology to biology. This is a good balance sheet of progress. Fortunately, it is not difficult today to keep track of merging boundaries and emerging sub-divisions, thanks to the internet.

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*The full version of the interview can be found at: 25 Jan 2012/166a.pdf.