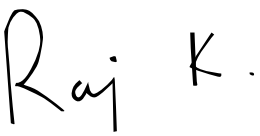
Molecules to Solids and Back

When I was a graduate student in the 1970s, solid-state chemistry was not on the radar screen of many research scientists in the physical sciences. Chemists then were mainly focusing their attention on the other two states of matter—namely, gases and liquids. How dramatically the situation has changed since then! The study of solids now occupies a central position in chemistry these days. Materials chemistry has evolved into a legitimate discipline in its own right. This is largely attributable to the spectacular advances in solid-state chemistry in the past three decades—an era that has witnessed plastic electronics and flexible light-emitting devices, high-temperature superconducting ceramics, inexpensive but efficient solar photovoltaic devices, fast ion ("super ion") conducting solid electrolytes, novel hydrogen-storage materials, and the like.

But this success story goes beyond solid-state chemistry. Thanks in part to the many lessons learnt from the study of solids and their structure-property relationships, we have now gone back to the inherent building blocks of solids to see how atom clusters and discrete molecules can lead to technology applications. This study of molecular solids now falls under the fashionable monikers of "moletronics," "nanoscience," and "nanotechnology." It must also be noted that this whole window of new opportunity has been thrown open by the increasing facility with which we can prepare, see, and manipulate solid matter on a nanometer size scale.

One can thus argue that we, in the chemical world, have come full circle: From the more traditional synthesis and study of molecules in the gaseous and dissolved (liquid) states, chemists have turned to and progressed in their understanding of the solid state. This in turn has enabled them to examine how solid atoms and molecules behave in the quantum regime, and how useful molecular devices can be assembled in a "bottom-up" manner (see also *Interface*, Vol. 10, No. 3, fall 2001).

This issue of *Interface* focuses on an exciting area in molecular solids, namely, molecular magnets. A glimpse into the immense possibilities in this area (especially in "spintronics") emerged from a 1990 article (L. Gunther, *Physics World*, December, p. 28) and a more recent update by this author may be found in the same magazine dated March 1999, p. 35. Further perspectives may be found in the foreword to this issue by Guest Editor, Joel Miller, of the University of Utah—a pioneer in the field of molecular magnets. Three feature articles on this topic have been assembled for this special issue of the magazine and we hope that you, the readers, enjoy them as much as we have, in bringing them to you. Stay tuned.



Krishnan Rajeshwar
Editor

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