

Summer-Session Courses

In my early days in science, it was frequently maintained that a true scientist should not think of how his work could be applied. But new insights must be tested in order to reveal the loopholes in our knowledge and I became convinced that scientists, engineers, manufacturers, and users of materials should learn to speak each other's languages and share their problems, failures and advances. This was the driving impulse that led to the summer-session courses of the Laboratory for Insulation Research at M.I.T. The first of these courses was held in September 1952 and brought together experts from science, industry and government with our own group in an exciting fortnight of teaching, learning, and listening. The edited lectures became the book *Dielectric Materials and Applications*,¹ which was published simultaneously with my own book, *Dielectrics and Waves*² -- both by John Wiley and Sons in the summer of 1954.

Dielectrics and Waves introduced interdisciplinary materials research. I dedicated it with a deep sense of friendship and gratitude to Niels Bohr and James Franck. *Dielectrics Materials and Applications* contained as an Appendix a first "unclassified" edition of our "Tables of Dielectric Materials" and was inscribed "to the memory of Karl Taylor Compton, beloved friend and counselor of scientists and engineers." Compton, the President of M.I.T. and gifted with a wonderfully kind and understanding personality, died just before *Dielectrics Materials and Applications* came out.

Two more summer courses were needed before the molecular designing approach was fully accepted. In 1956, we invited a group of colleagues to participate in a summer session on "Molecular Engineering," which ranged from the formation and structure of atoms and molecules; to the designing of liquids and solids, the development of electric and magnetic properties, explosions and breakdown; to the air vehicles of the future. The resulting book, *Molecular Science*

and Molecular Engineering,³ summarizing the outcome was a two-year effort which was finished in September 1958.

Still one more push was needed before the bandwagon began to roll. Asking "what is the present status of our insights and capabilities," the L.I.R. sponsored a summer-session course on "The Molecular Designing of Materials and Devices in 1963." The subjects ranged from "Prediction of *a-priori* Theory" and "Building from Atoms" all the way through structure and properties of nonliving and living systems. The book, summarizing the insights of the scientists and engineers involved, was published in 1965 and marked the close of our effort.⁴

The battle had been won and the I had reached retirement age. The Government wanted me to build a "Federal Center for Materials Science and Technology," but I insisted that such Centers belonged in the Universities where young minds should be preconditioned for such integrating understanding. "Centers for Materials Science and Engineering" were therefore formed at various universities. They were still somewhat saddled with departmental allegiances, however, and not quite ready yet to embrace also the life sciences and medicine.

After a year of service in Washington as Science Adviser of the Naval Research Laboratory, I continued with a small research group under the name of the Laboratory for Insulation Research on our way "From Atoms Towards Living Systems,"⁵ until old age called a halt.*

* Of the many good scientific friends and associates I had the fortune to acquire, our books and reports provide documentation. Three of them remained my companions over several decades, however, and must be mentioned with especial gratitude: Bill Westphal, leader of the Dielectric Measurements Group; Aina Sils, secretary and librarian; and John Mara, illustrator of our publications.