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John D. Hoffman

On November 22, 1997, John D. Hoffman marked his 75th birthday. In a scientific career spanning five decades, he has served in public, private, and academic arenas and has made significant contributions, both as a researcher and as a research manager, to the vitality of materials science.

He was born in Washington, D.C., and spent his childhood both there and in the rural Pennsylvania Dutch country of his ancestors, which accounts for his lifelong interest in hunting. For many years, he was also a strong long-distance swimmer. He graduated in 1942 with honors in chemistry from Franklin and Marshall, after which he served in the U.S. Army, on the Manhattan Project. While in the Army, he received the Soldiers Medal for "heroism in the highest degree" during a potentially fatal laboratory accident. After the war, he enrolled in the Chemistry Department at Princeton, and earned M.S. and Ph.D. degrees under C. P. Smyth on molecular rotations in solids.

In 1949, he was hired as a Research Associate in the Research and Development Center of General Electric, working on the dielectric relaxation of long chain hydrocarbons. In 1954 he joined the U.S. National Bureau of Standards (NBS), continuing his work on the dielectric and mechanical properties of polymers. He eventually attained a number of management positions at NBS: Chief of the Dielectrics Section ('57−'62), Chief of the Polymers Division ('62−'67), Director of the Institute for Materials Research ('67−'78), and finally Director of the National Measurement Laboratory ('78−'82). In his management career at NBS, he has contributed significantly to the development of one of the world's finest materials science labs. The years at NBS also saw his research interests shift to the crystallization of polymers.

In 1982, Hoffman left NBS to become the director of the Engineering Materials Program of the University of Maryland, and in 1985 he became the director of the Michigan Molecular Institute (MMI) in Midland, MI. After a 5-year tenure at MMI he returned to teaching, joining the Materials Science and Engineering faculty at The Johns Hopkins University. Throughout his management and teaching career he has continued to find time for research, primarily in the field of polymer crystallization.

Hoffman is the recipient of the Washington Academy of Sciences Award in Physical Science, the U.S. Department of Commerce Gold Medal, NBS's Samuel Wesley Stratton Award, the APS High Polymer Physics Prize, and the Presidential Meritorious Executive Award, and in 1980 he was elected to the National Academy of Engineering.

He initiated two Gordon Research Conferences (Dielectric Phenomena and Polymer Physics), served as Chairman of the Board of Trustees of the Gordon Research Conferences, and also served on editorial boards of both *Macromolecules* and the *Journal of Polymer Science* (Physics Edition).

His early theoretical and experimental work in the field of dielectric and mechanical relaxations grew out of his thesis work at Princeton on molecular motions in solids. He has pioneered the development of site models of dielectric relaxation.[1]

With colleagues at NBS he produced a detailed analysis of dielectric and mechanical relaxations in semicrystalline polymers[2] that has had a significant impact. In particular, the pioneering work on the dielectric α_C relaxation[2,3] has inspired theoretical and computational studies by a generation of scientists.

Hoffman's involvement and leadership in the area of polymer crystallization has spanned the last four decades. One of his early achievements in the field is the derivation of the relationship between the crystallization temperature and the observed melting temperature of lamellar polymer crystals. This work would eventually lead to the famous "Hoffman−Weeks" plot,[4] but it

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was not Hoffman's intention to determine accurately the equilibrium melting temperature of polymers. It was merely developed to provide N. Bekkedahl, one of Hoffman's seniors at the Bureau, with a justification for the then puzzling observation that natural rubber crystals do not exhibit a unique melting point.

During his tenure at NBS, Hoffman built a team of premier scientists whose dedication to theoretical and experimental aspects of crystallization and morphology have paved the way to a better understanding of crystalline polymers. As it was realized early on that an exact or even fine-grained theoretical treatment of crystal growth processes in polymeric systems was a hopeless venture, Hoffman, in collaboration with other theoreticians at the Bureau, developed a coarse-grained kinetic approach to the chain-folding process.[5−7] This treatment, known today as the Lauritzen−Hoffman surface nucleation model, clearly provides the most comprehensive account of the temperature dependence of both the growth rate and the initial thickness of polymer lamellar crystals. Recent refinements of the theory[8] have dealt with a number of issues: the existence of crystallization regimes, the quantization of chain folding, the effect of chain length on crystal growth and morphology, and the degree of adjacent reentry folding. Although experimental and theoretical studies carried out under Hoffman's leadership have focused for the most part on linear polyethylene, a vast number of publications during the last four decades have shown that the above concepts are highly relevant to other flexible chain polymers.

Hoffman's record as a prankster at Gordon Conferences is second to none. However, on one occasion the tables were turned when he awakened to find a large, live iguana lying beside him in his bed. Exactly how large seems unclear, the lizard gets longer each time Hoffman tells the story, but our best efforts at extrapolation put it in the 1−2-m range.

References and Notes

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