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Tribute to Richard H. Boyd

This year Richard H. (Dick) Boyd became Distinguished Professor Emeritus of Materials Science and Engineering and Chemical Engineering at the University of Utah. 2004 is also momentous in that it marks Dick's 75th birthday. Dick was born in Columbus, Ohio, and graduated with a B.Sc. in Chemistry from The Ohio State University. He received his doctorate in Physical Chemistry from the Massachusetts Institute of Technology in 1955. After seven years at the DuPont Experimental Station, where he began his work with polymers, Dick moved to Utah, where he joined the Chemistry faculty at Utah State University in Logan. In 1967 Dick joined the Department of Chemical Engineering at the University of Utah in Salt Lake City and in 1969 helped found the Materials Science and Engineering Department. He became the second chair of the Materials Science and Engineering Department in 1977 and has held the rank of Distinguished Professor of both Chemical Engineering and Materials Science and Engineering since 1988.

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Dick is one of those rare individuals who have made highly influential contributions to his chosen field in multiple disciplines. Dick has both performed world-class dielectric and dynamic-mechanical studies of relaxation phenomena in polymers and has been at the forefront of modeling and simulation of these processes. He was among the first to bring the power of "modern" computers[1] to the problem of determining, visualizing, and interpreting polymer conformations and associated motions and relaxation processes. Dick is widely recognized for his contributions to molecular mechanics studies of conformationally flexible molecules, including determination of thermodynamic properties and advances in minimization algorithms.[2] His molecular mechanics studies of crankshaft motions in polyethylene and their relationship to the γ process[3] were instrumental in quantitatively relating local polymer backbone motion to sub-glass relaxation processes, while his molecular mechanics studies of conformational defect formation and motion in polyethylene crystals (the "Utah Twist") and their relationship to the α process in semicrystalline polyethylene[4] constitutes the first irrefutable mechanistic assignment of a relaxation process in a polymer beyond processes associated with side-group rotations. More recently, Dick has pioneered the use of molecular dynamics simulations in the study of sub-glass relaxations in polymers, including side-group rotation[5] and main-chain motion.[6,7] The latter studies utilized the first microsecond polymer simulation and were the first works to discuss the implications of dramatically increasing heterogeneity in conformational transitions with decreasing temperature in polymer melts. On the experimental side, Dick has performed seminal studies of dielectric relaxation in amorphous polymers, copolymers, and particularly semicrystalline polymers, where his reviews of experimental studies[8] and molecular interpretations of relaxation processes[9] remain the standard.

Dick's academic and professional contributions have been widely recognized. In 1979 he received the University of Utah Distinguished Research Award, in 1988 the American Physical Society (High) Polymer Physics Prize, and in 1992 the Society of Plastics Engineers International Award. Dick has chaired the Division of (High) Polymer Physics of the American Physical Society and has served on the editorial advisory boards of many polymer journals, including *Polymer* and *Macromolecules*. Beyond his scientific contributions to our understanding of relaxation processes in polymers Dick has positively impacted the lives of the myriad of students who have had the pleasure of learning polymer physics from a truly gifted and enthusiastic instructor. He has had an even greater impact on the lives and careers of those who have had the pleasure of working with him, including 24 Ph.D.'s. Included among those who have had the pleasure of working with Dick is John Warnock, co-founder and CEO of Adobe Systems. As a Ph.D. student in Computer Science and Engineering at the University of Utah, John Warnock was developing a method for handling the "hidden-line" problem where foreground objects obscure parts of background objects in realistic 3-D computer-generated pictures of objects, and the hidden parts have to be erased. Together, John and Dick made quite a number of molecule pictures and animations utilizing the new Univac 1108 at the University of Utah, as shown for example in Figure 1. Since its humble beginnings, 3-D computer visualization of polymer molecules become an invaluable tool in understanding polymer conformations, packing, and dynamics.

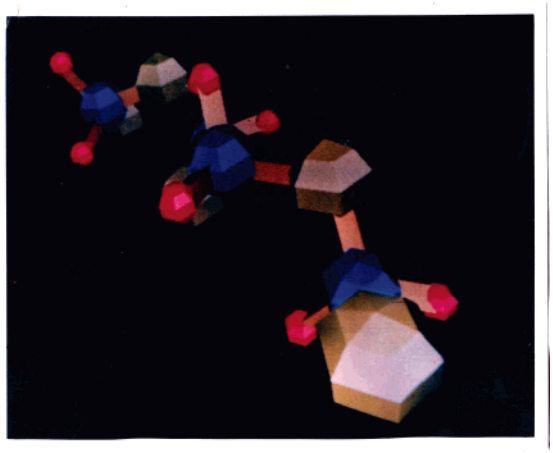

Figure 1. A 3-D color image of an oligomer of poly(oxymethylene) generated by Richard Boyd and John Warnock on the University of Utah Univac 1108 in 1969.

These days Dick and Pat are most likely to be found at their home on the central California coast where Dick spends much of his time participating in activities of the Morro Coast Audubon Society or working on a book he is co-authoring with the author of this tribute. Otherwise, you may find Dick and Pat visiting family in Salt Lake City, enjoying their cabin in Wyoming, lecturing in Stockholm, or searching for rare birds almost anywhere in the world. On a personal note, the author of this tribute is truly thankful to have had the privilege to work under the tutelage of Dick Boyd and later as his colleague at the University of Utah. His professional accomplishments are matched only by his humanity: Dick is a true gentleman in every sense of the word, and his presence at the University of Utah is sorely missed.

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References and Notes

(1) These range from the Univac 1108 to the IBM 3090 to Pentium Linux clusters.
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