

polymers, which consist of crystallites, amorphous material and crystalline connections. But because a random structure is more difficult to visualize, the crystalline polymers have received much more attention, especially over the last decade. Now, with the outlines of the crystalline nature of polymers well delineated, we should see a faster pace of research on glassy polymers. Hence, as a compendium and summary of present knowledge, *The Physics of Glassy Polymers* makes an opportune appearance.

Covered in the book are the thermodynamics of glassy polymers, their

transitions at temperatures below that of the glass transition, their gas diffusion and sorption, and their microscopic structure—as slaves to a tradition of easily visualized structures, we are compelled to search for patterns within the randomness. In the chapter by M. J. Folkes and A. Keller on the morphology of regular block copolymers, however, the structures are well defined and arise from the segregation of immiscible polymer blocks. More than half of the book, though, covers the viscoelastic behavior and high-strain response to applied stresses.

The fracture and crazing of glassy

and rubber-toughened polymers are treated in two chapters by E. H. Andrews, J. Mann, and G. R. Williamson, plus a bit in the chapter on vapor sorption by H. B. Hopfenberg and V. Stannett. The yielding and post-yielding of glassy polymers is treated in two chapters by P. B. Bowden and R. N. Haward. In an engaging chapter on creep, the author, S. Turner, challenges the polymer physicist to continue the search for the elusive quantitative rationalization of creep and recovery data, data that are invaluable as a guide to the use of plastics. Finally, the editor, R. N. Haward, of the University of Birmingham, has added an introduction consisting essentially of several incisive essays, which as he states, “fill in certain areas which are not themselves dealt with in detail in later chapters.”

The book is recommended for researchers in the field and for those working with other materials who wish to be aware of the analogous properties and behaviors of glassy polymers. The authors of each of the ten chapters in the book are experts who have contributed to the fields of their topics. The book is well illustrated, and as a convenience to the reader, has a table for converting between units.

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Science and the Evolution of Public Policy

J. A. Shannon, ed.
288 pp. Rockefeller U. P., New York
1973. \$11.00

In 1966 Lyndon Johnson paid an extensive visit to the National Institutes of Health, the Federal Government's mammoth medical research center outside Washington. After meeting with the researchers, the President observed that the time had come to bring the research results obtained by the scientists out of the laboratories and into practical use. The science-government relationship has not been the same since.

That relationship has never been one of uninterrupted bliss. Since the honeymoon during World War II, when Vannevar Bush brought science and government together in a successful union, there have always been clouds on the horizon and occasionally major storms. The loyalty-oath controversy of the 1950's culminating in the Oppenheimer decision was one such storm. Other disturbances were occasioned by individual research projects such as Mohole and Camelot. The discussions of such questions as a limit

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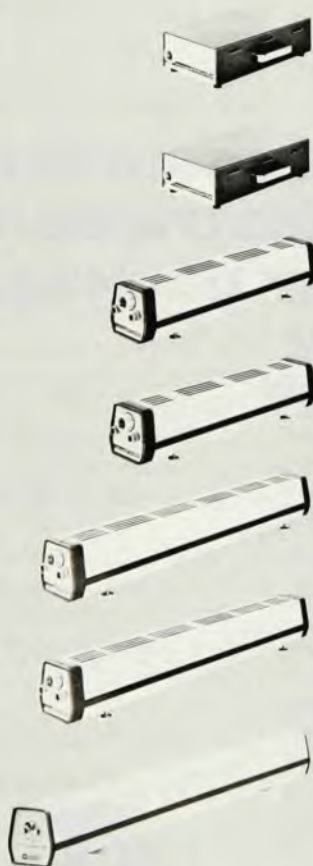
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on overhead costs and the geographic distribution of research grants received less public attention, but were of equal if not higher importance to the evolution of the science-government relationship.

In most of these controversies the underlying question was that of responsibility, or, more accurately, accountability. In an arrangement where the government supplies the material means and where the scientist feels bound less by the purposes of government and more by the obligations and values of science, how can both meet the ultimate requirement of accounting for their stewardship?

Toward the end of the 1960's, the leveling-off of research funding and the simultaneous rise of a new generation that questioned the social utility of science and technology led to yet another disturbance in the science-government relationship. While the public discussion covered a number of the symptoms, the underlying question was the usefulness of government-supported research. Bush had spoken of the need to keep the trough of basic research findings full so that it could be tapped for ideas leading to new technology, and for a quarter of a century that had been the chief rationale for government support of research. Now the issue was whether the continued support of basic research across a broad front essentially defined by the scientists themselves should continue, or whether the government, through the many sponsoring agencies, should direct, if not the tactics of the assault on the unknown, then at least the broad strategy of that assault in order to ensure that the technological pay-off was maximized.

That question is the main theme of this volume. James Shannon, who for many years was Director of the National Institutes of Health, and who was there when President Johnson issued his call for results, has brought together twelve notable authorities for a series of discussions of some of the current issues of accountability in the science-government relationship. The discussions range from the Mansfield Amendment and Project RANN to a provocative discussion of the extent to which the current ferment marks a significant transition in the science-government relationship. Some argue that during the years of rapidly growing research funding the deficiencies of the science-support system were hidden and that these deficiencies are now becoming obvious, as, for example, in the case of the financial plight of the universities. Others discuss the need for stability and flexibility in the support of research. Yet others find both the demands for stability and flexibility and the science-support system in

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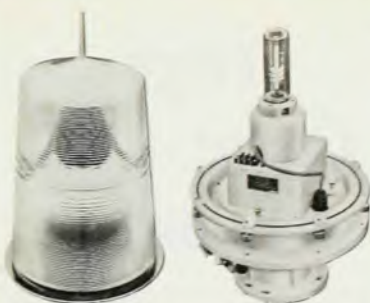
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general difficult to reconcile with the increased demands for demonstrable pay-off.

The different viewpoints of the many authors produce an unavoidable unevenness, but on balance this is more illuminating than distracting. The contrasts in concern and style force the reader to weigh the merits of each. If there is one disappointment it is that Shannon, after his long and distinguished career as a government science administrator, is not himself a contributor in any significant way. This book is of interest both to the scientists with an interest in the government-science relationship and to those with a professional interest in matters of science policy. They will find it a lively source of ideas about the present and future state of a union that both partners agree must continue, but in which neither wants to be taken for granted.

* * *

The views expressed are the reviewer's own.

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Theoretical Physics, Vol. 4: Quantum Statistics and Physical Kinetics

B. G. Levich
401 pp. Wiley, New York, 1973. \$15.50

This fine book, the fourth and final volume of the first English (and second Russian) edition of Benjamin Levich's *Kurs Teoreticheskoi Fiziki*, is primarily concerned with nonequilibrium statistical physics. In the foreword to the first edition, the author expresses the hope "that the readers, after making themselves familiar with the foundations of theoretical physics expounded in this book, will be able to proceed to a more profound study using the many-volume treatise of Landau and Lifshitz." I do not think that this linear ordering does his work justice. What we have here is in part a preliminary briefing—a furnishing with equipment prior to the journey into those vast mountainous territories. But it is also clear that Levich enjoys climbing a mountain or two himself, and I for one—being generally made dizzy by heights—must confess that I sometimes would welcome a helping hand to guide me over the rocks, rather than leaping from pinnacle to pinnacle in pursuit of the Master.

I was particularly impressed by Levich's treatment of the Boltzmann

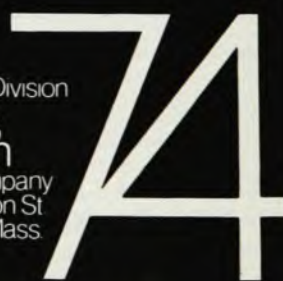
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