

# This Week's Citation Classic

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**Bueche F.** *Physical properties of polymers*. New York: Interscience, 1962. 354 p.  
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A detailed treatment of the molecular principles underlying the physical properties of polymers is given. Although designed for the novice, the discussions pursue each topic to a rather high level of mathematical sophistication. Extensive comparisons between theory and existing data are presented. [The SC<sup>1</sup>® indicates that this book has been cited in over 590 publications since 1962.]

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"It was in 1949 that, with a fresh PhD in physics, I strayed across the street at Cornell University to begin work with P. Debye in the chemistry department. Those were exciting times in my newly chosen field, polymer physics. Many of the leaders, and emerging leaders, in polymer physics and chemistry were there. The enthusiasm of Debye, Flory, Tom Fox, Kirkwood, my brother Art, and the others was infectious. During the next ten years the world was to acquire a respectable understanding of the molecular basis for the physical properties of polymers.

"Entering a new field such as this was difficult because of the lack of readable texts and review papers. (*Mechanical Behavior of High Polymers*<sup>1</sup> and *The Chemistry of High Polymers*<sup>2</sup> were most valuable to me.) In a way this was fortunate. It forced me to form my own conclusions concerning the processes involved. Several years of teaching in the relative isolation of the University of Wyoming also contributed to my individualistic approach to the subject.

"Upon my acceptance of a position at the University of Akron in 1960, I experienced a

much decreased teaching load and the responsibility for several graduate students. It was apparent to me that the students needed a text that would summarize the state of knowledge in the field. Moreover, there were many mathematical techniques and data analysis methods important to the field that were almost impossible for the beginning student to track down or even to know existed. Oftentimes even I had to search my memory or relearn a procedure that had escaped my mind.

"At Akron I had time to set out in book form those principles of polymer physics that I considered most important and well enough understood to have more than transitory value. The book took only a few months to write because, for the most part, I simply explained on paper what I would explain to the novice entering the field. It was to be a textbook for the beginner in polymer physics. Aimed at chemists and engineers (there were hardly any physicists in the field then!), it was to be primarily conceptual in nature. The mathematics was there but it could be mostly avoided without losing sight of the molecular basis for the principles. In addition, I placed in it material that I myself wanted to remember.

"Despite its elementary nature, the text did include many advanced, and sometimes novel, computations and insights. But the text was not intended to advance knowledge in the field as much as it was to make people aware of the knowledge and techniques that had been acquired over the past decade. It was designed as a source book for the person entering the field. (The texts cited below appeared at almost the same time.<sup>3-5</sup>)

"As it turned out, I left Akron before the book was published. Missing a full undergraduate teaching load, I moved to the University of Dayton and that is why my affiliation is given as it is on the title page.

"Why has this book been cited frequently? I can only guess. Perhaps the students who have used it find it a convenient place at which to point their finger when a reference is needed. Or, perhaps like me, people use it as a convenient tool for refreshing their memory. Today it is hopelessly out of date. But I wish someone (not me!) would write another one like it."

1. **Alfrey T, Jr.** *Mechanical behavior of high polymers*. New York: Interscience, 1948. 581 p.

2. **Bawn C E H.** *The chemistry of high polymers*. New York: Interscience, 1948. 249 p.

3. **Tobolsky A V.** *Properties and structure of polymers*. New York: Wiley, 1960. 331 p.

4. **Ferry J D.** *Viscoelastic properties of polymers*. New York: Wiley, 1961. 482 p.

5. **Billmeyer F W, Jr.** *Textbook of polymer science*. New York: Interscience, 1962. 601 p.