Polymer Crystallization at NBS/NIST (1960s-1980s)

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The earliest studies of the crystallization of polymeric materials at NBS/NIST date back to the dilatometry-based investigations of the crystallization rates and melting behavior characteristics of natural rubber by N. Bekkedahl and L. A. Woods in the mid-1930s and 1940s. This pioneering work was followed in the 1950s investigations led by L. Mandelkern on the thermodynamics of the bulk crystallization of polymers. The next sustained studies on the crystallization of polymers encompassing extensive structure/property investigations, followed the seminal papers published by J. D. Hoffman, and J. I. Lauritzen, Jr. in 1960-61, proposing the kinetic theory of polymer crystallization with chain folding from solution and from the melt. This kinetic theory, which is a surface nucleation theory, and the ramifications it has undergone over the years at the hand of these authors, and the very significant contributions of others in the Polymers Division, remains prevalent to this day. Paralleling these theoretical efforts, were extensive studies by many Division members which encompassed polymer structure/property (e.g. mechanical, piezoelectric) investigations, as well as morphological diversity, and other crystalline structure relayed studies. A broad-brushed overview of these various activities in the Polymers Division in the 1960s-1980s will be offered.