

MECHANICAL & INDUSTRIAL COLLOQUIUM

Fall 2011 SEMESTER: ME 794-001

Wednesday, September 21, 2011

1:00-2:25pm

MEC 224

Professor Michael Jaffe

Department of Biomedical Engineering and Department of Chemistry

New Jersey Institute of Technology

Director of Medical Device Concept Laboratory

Formation of Microporous Polymer Membranes from “Hard Elastic” Precursors

Abstract

Highly oriented, highly crystalline polymers showing high elastic recovery, coupled with void formation during straining have been known since the 1960's yet literature relating the properties of these materials to the starting polymer or processing parameters is sparse. We propose a model to relate polymer backbone chemistry, molecular weight distribution and melt processing variables to hard elastic behavior and ultimately to the formation of films or fibers with controlled microporosity. The model is initially developed for polyolefins, including polyethylene and polypropylene. The results of the model suggest that it is a combination of MWD and crystallization environment that leads to the integration of crystalline morphology and chain topology required for hard elastic/microporous performance. The model will provide the basis to extend current applied technology beyond the limited range of polymers currently employed, to achieve a broader range of property/performance levels and potential end-use/application capabilities for both fibers and films.

Biography

Professor Jaffe is a Research Professor of Biomedical Engineering and Chemistry at the New Jersey Institute of Technology and the Director of the Medical Device Concept Laboratory. Previously, he was a Research Fellow at the Hoechst Celanese Corporation, which he joined upon completion of his Ph.D. in Chemistry from Rensselaer Polytechnic Institute in 1967. His work has focused on understanding the structure-property relationships of polymers and related materials, the application of biological paradigms to materials design and the translation of new technology to commercial reality. He is a past chairman of the U.S. Policy Committee for IUPAC, a member of the ACS Committee on Budget and Finance and an editor of the Journal of Engineered Fibers and Fabrics. He is a past member of the National Materials Advisory Board, is a past chairman of the Polymeric Materials: Science and Engineering Division of the American Chemical Society and has served on panels of the NSF, DOD, DOE, NASA and NIST. He has authored more than 75 technical publications, fifteen book chapters and 15 patents. He is a fellow of IUPAC, AAAS, PMSE and NATAS, a National Associate of the National Research Council and was the recipient of the 1995 and 2011 Thomas Alva Edison Patent Award presented by the Research and Development Council of New Jersey.

For further information, please contact Dr. A. Narh, MIE Department (narh@njit.edu; 973-596-3333)

