Institute of Polymeric Materials and Testing

JOHANNES KEPLER UNIVERSITY LINZ | JKU

Lecture:

„Degradation and Crack Growth in Polyethylene“

by

Prof. Susan Mantell
University of Minnesota
Solar Energy Laboratory

Date: **Friday, December 5th, 2014**

Time: **11:00 a. m.**

Location: **Science Park 2, S2 0120**
Johannes Kepler University
Altenberger Straße 69
4040 Linz

Brief Biography
Prof. Susan Mantell

Susan Mantell is Professor and Associate Head of Mechanical Engineering at the University of Minnesota. Prof. Mantell received her BS and PhD degrees from Stanford University. Her current research focus is on applications of polymer materials for engineering structures. She also has an extensive background in manufacturing processes for fiber reinforced plastics. She has received several best paper awards from the American Society of Mechanical Engineering, and the National Science Foundation Young Investigator Award.

Abstract

Polymers are increasingly being used for engineering structures, civil infrastructure and medical devices because of their excellent corrosion resistance and low cost compared with metals. However, the lifetime of plastics used in severe environments is significantly reduced due to stress corrosion cracking (SCC). In this talk, a methodology for investigating SCC in polymers will be presented. In our approach, a mechanical model for crack growth in polymers has been developed that incorporates a viscoplastic (VP) material model for the bulk region and a CZM for the crack region. The VP and CZM models have been integrated into ABAQUS via user defined subroutines. Material mechanical properties required for the model have been experimentally determined for virgin and degraded HDPE. A parametric study will also be presented that demonstrates evaluate the sensitivity of crack growth to loading and the extent of degradation.