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Deformation Mechanisms of Polyethylene via *in-situ* X-ray Scattering. Brian G. Landes, Theresa J. Hermel-Davidock* , Willem DeGroot*, Mehmet Demirors*, Rajen Patel*, Tracy Peltier*, Danny King*, Steven Weigand**, The Dow Chemical Co., Midland, MI 48667, *The Dow Chemical Co., Freeport, TX, 77541, **DND-CAT, APS/ANL, Argonne, IL 60439.

Changes in the microstructure of ethylene based copolymers can be used to modify and enhance their mechanical performance. However, polyethylene films exhibiting very different performance may not be differentiated by standard tensile test methods. Alternative methods that link morphology and mechanical response need to be found. In this study the mechanical performance of select polyethylene polymers were examined. Wide-angle and small-angle x-ray scattering data were collected *in-situ* during tensile testing to understand the mechanical response of semicrystalline polyethylene polymers. A comparison of continuous stretch, and stop/hold experiments was performed. These studies reveal that the method of experimental interrogation has a direct impact on the morphological response, and thus the performance, in these systems. Methods for reduction of these large volume data sets will also be reviewed.

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