

Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

An In-Situ X-ray Scattering Study during Uniaxial Stretching of Ionic liquid/Ultra-High Molecular Weight Polyethylene Blend XIAOWEI LI, YIMIN MAO, HONGYANG MA, BENJAMIN S. HSIAO, Stony Brook University — The 1-docosanyl-3-methylimidazolium bromide ionic liquid (IL) was incorporated into ultra-high molecular weight polyethylene (UHMWPE) to form IL/UHMWPE blend by solution mixing. The structure evolution of this blend system during uniaxial stretching was followed by in-situ synchrotron wide-angle X-ray diffraction (WAXD) and small-angle X-ray scattering (SAXS) techniques. During deformation at room temperature, the elongation-to-break ratio of the IL/UHMWPE blend increased by 2 - 3 times compared with pure UHMWPE sample, where the blend did not lose the tensile strength. Deformation-induced phase transformation from orthorhombic to monoclinic phase was observed in both blend and neat UHMWPE. During deformation at high temperature (120 °C), no phase transformation was observed in both samples. However, the blend showed better toughness, higher crystal orientation, and tilted lamellar structure at high strains.

Xiaowei Li
Stony Brook University

Date submitted: 18 Nov 2010

Electronic form version 1.4