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Crystalline polymer thin films characterized with NEXAFS dichroism microscopy H. ADE, T. ARAKI, Y. ZOU, NCSU, Y. WANG, M. RAFAILOVICH, J. SOKOLOV, SUNY@StonyBrook — The sensitivity of Near Edge X-ray Absorption Spectroscopy (NEXAFS) to bond orientation holds the promise that it can be used in a conjunction with an x-ray microscope to the study the organization of thin films of semi-crystalline polymers. Linear Medium Density Polyethylene (LMDPE) (ρ=0.95 g/cm^3) has been processed into thin films 20-60 nm thick, which were subsequently recrystallized, and characterized with the 5.3.2 x-ray microscope at the Advanced Light Source. Films thicker than 35 nm show spherulitic crystals with primarily edge-on lamellar orientation. Films 25 nm thick, show feather-like structures with significantly more flat-on lamellar character. The results show that improved sample handling should be implemented to allow for in-situ sample rotation. This would significantly improve the sensitivity to small title angles of the carbon-carbon backbone relative to the surface normal.

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