Abstract Submitted
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Atomic scale images of polyvinylidene fluoride nanofibers by electron microscopy[1] DARRELL RENEKER, University of Akron, CHRISTIAN KISIELOWSKI, Lawrence Berkeley National Laboratory, GEORGE CHASE, DINESH LOLLA, JOE GORSE, University of Akron — Atomic scale electron micrographs of polyvinylidene fluoride (PVDF) molecules in thin ($\sim$ 3 nm) nanofibers revealed twist around the axes of molecular chains, small relative motions of adjacent molecular chains and many other structural and dynamical phenomena. The positions and relative motions of CF2 groups, spaced 0.25 nm apart, on (PVDF) molecules, were followed along polymer segments. Atomic scale, aberration corrected electron microscopy is presently at its best when the sample is less than about 3 nanometers thick. Conformations of segments of polymer molecules, and the relations between more ordered and less ordered segments are displayed in this thickness range. The TEAM 0.5 aberration corrected microscope at the Lawrence Berkeley Laboratory "Molecular Foundry," was used to create hundreds of high magnification images of PVDF molecules in nanofibers, at electron doses much smaller than the doses that produce extensive chain scission or other such chemical changes in the molecules. A commonly held view, that useful high magnification electron micrographs of polymer molecules cannot be obtained without causing overwhelming changes to the molecule, is misleading.

[1]Support from Coalescence Filtration Nanofiber Consortium.

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