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Unusual Semi-Crystalline Morphology of a Precise Carboxylic Acid Polyethylene KAREN WINEY, EDWARD TRIGG, ROBERT MIDDLETON, University of Pennsylvania, UNIVERSITY OF PENNSYLVANIA COLLABORATION — Linear polyethylenes with precisely periodic functional groups (precise polyethylenes) exhibit novel morphologies, including a multi-layer adjacent reentry crystal structure in a carboxylic acid containing precise polyethylene. Here, we explore chain orientation within lamellae via X-ray scattering. A comparison of the long period (via SAXS) and the layer-layer correlation length (via the Scherrer equation) implies that the functional group layers are not coplanar with the lamellae, and may in fact be perpendicular. This finding also implies that the trans alkyl segments are oriented in (or near) the plane of the lamellae, in contrast with polyethylene. The implications of this finding are discussed with respect to prior work on morphological evolution during tensile deformation, and current work on transport of charged species through crystallites of precise polyethylenes.

Karen Winey
University of Pennsylvania

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