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### **Fifty (Plus) Years of Polymer Nano-Science (Art)<sup>1</sup>**

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At least one dimension of the fundamental structure of all polymers, on the next hierarchical size scale larger than the repeat distance and unit cell, is on the order of 100 Å; hence these days one uses the label “nano.” This includes the coil size in solution and melt, and the morphology of both crystalline and block polymers. For study of morphology, the principle techniques, until recently, have been transmission electron microscopy (TEM) and small angle x-ray diffraction, with polymer TEM being the “art of producing interpretable artifacts.” Having first been shown chain folded polyethylene single crystals almost exactly 51 years ago, we will summarize and represent some half century of morphology research, and the resulting art, including addressing the areas of nucleation, growth from solution and melt, and deformation of macromolecular materials. Particular emphasis will be placed on early observations with implications on various current crystallizable polymer morphology proposals including chain folding regularity, spherulite nucleation and growth, molecular mobility in the melt and thin film crystallization.

<sup>1</sup>Downloadable copies of “Polymer Single Crystals,” summarizing the first several years of polymer morphology studies, are now available through <http://www.agpa.uakron.edu/resources/crystals.html>