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Single Crystal Insights into Powders and Fibers - a Role for Electron Crystallography? D. L. Dorset, Corporate Strategic Research, ExxonMobil Research & Engineering Co., 1545 Route 22 East, Annandale, NJ 08801.

Crystal structure determination for fibers or powders can be difficult, particularly when their diffraction patterns contain extensive reflection overlap as well as few data. Electron diffraction probes single microcrystals, resolving dimensional and/or symmetry ambiguities left after attempts to index powder or fiber diffraction data. With improved crystallization of polymers, including epitaxial orientation, full 3-D single crystal data sets can be collected in the electron microscope. Direct structure determinations have been carried out successfully for several representative materials. While analyses of polymer fiber data might also find the correct crystal structures, certain polymorphs yield only powder data with extensively overlapped reflections, again demonstrating a use for electron crystallography. For zeolites, synchrotron powder intensities are routinely used for structure analysis, where electron diffraction information can narrow the choices of possible space groups after pattern indexing. In some cases, direct methods have also recovered correct zonal structures from experimental electron diffraction intensities; 3-D data sets may also be useful. Current efforts attempt to minimize multiple scattering effects during e. d. data collection.