Abstract Submitted
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Diamond-shaped small-angle scattering and the deformation of fibrous textures[1] WENJIE WANG, University of Vermont, N. SANJEEVA MURTHY, Rutgers University — Small-angle x-ray scattering from materials with fibrous texture are typically characterized by intense diamond-shaped equatorial streaks. Single family of elongated voids aligned along the fiber axis modeled as ellipsoids with a certain orientation distribution yield a fan-like 2D pattern. The diamond-shaped patterns from fibers, such as polyesters, polyamide 6 and polyacrylonitrile, could not be explained with such single class of misoriented voids. Analysis of the orientation distribution and the isointensity contours suggest that there are at least two distinct entities that contribute to this equatorial scattering. Voids with larger cross section ($\sim$ 20 nm dia.), which are likely to be in the interfibrillar regions, give rise to low-q contours with smaller eccentricities and respond poorly to deformation. Entities with smaller cross section ($\sim$ 5 nm dia.), which are likely to be in the intrafibrillar regions, give rise to high-q contours with larger eccentricities and respond to deformation in the same way as crystalline domains. The scattering from these objects appear as two distinct families of elliptical contours with different eccentricities, and the observed diamond-shaped scattering results from the superposition of these two sets of contours.

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