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Member of the Field of Textiles, member of the American Physical Society, the American Chemical Society, the Electron Microscopy Society of America, and the Royal Microscopical Society. Graduate students have included Peggy Cebe, now Professor of Materials Science at Tufts University and Donald Morel, now President and CEO of West Pharmaceutical Services Inc.

Current Research

Polymer structure and its relation to mechanical properties is a continuing focus of research. The polymers studied are both synthetic and natural – structural proteins – and are all semi-crystalline. A major use of such materials is in fibers, such as nylon, Kevlar, and spider silk. The crystals in these materials are on the nanoscale, typically 10 nm across, and are textured (aligned) in fibres and drawn films. Tools for structural investigation include electron microscopy, micro-Raman spectroscopy, NMR, and X-ray scattering at both wide and small angles. Synchrotron radiation source are particularly useful.

Research Projects

Study of the effect of water on the internal micro-structure of nylon fibers (dry nylon is brittle; nylon absorbs up to 9% of water by weight in humid air).

The use of microbeam synchrotron X-ray sources to investigate the local structure of semi-crystalline polymers by mapping the diffraction pattern. Beams only 400nm have been used to look at spherulite structure, edge scattering, and the internal structure of feathers.

Structure and mechanical properties of beta-keratin in its natural state (this crystalline protein is the primary constituent of feathers) and study of its self-assembly with the aim of obtaining well-oriented fibers from protein solution.

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David Grubb

Investigation of the general features of small angle X-ray patterns from polymer fibers. The inverse problem of pattern => structure is far from solution.

Select Publications

Sawyer LC ,Grubb DT and Meyer, GR *Polymer Microscopy: Third Edition*. Springer. In press. Due Dec 2007

Wang W, Murthy NS and Grubb DT *'Butterfly' small-angle X-ray scattering patterns in semicrystalline polymers are double-elliptical*. *Polymer* 48 (12) 3393-3399 2007

Murthy NS, Grubb DT *Tilted lamellae in an affinely deformed 3D macrolattice and elliptical features in small-angle scattering*. *Journal of Polymer Science Part B-Polymer Physics* 44 (8): 1277-1286 2006

Murthy NS, Grubb DT *Deformation in lamellar and crystalline structures: in situ simultaneous small-angle X-ray scattering and wide-angle X-ray diffraction measurements on polyethylene terephthalate fibers*. *Journal of Polymer Science Part B-Polymer Physics* 41 (13): 1538-1553 2003

Grubb DT, Ji G *Molecular chain orientation in supercontracted and re-extended spider silk*. *International Journal of Biological Macromolecules*, 1999. 24(2-3): p. 203-10.

Awards and Recognition

Oxford University Physics BA 1966

Oxford University Physics	BA	1966
	MA	1970
Oxford University Metallurgy and Materials Science, D. Phil		1970
Thesis title: "The Electron Microscopy of Crystalline Polymers"		
Bristol University Physics Dept.	PostDoc	1969-1972
Macromolecular Research Center, (CRM) Strasbourg, France	PostDoc	1972-1973
Bristol University Physics Dept.	PostDoc	1973-1978