GRAZING-INCIDENCE X-RAY DIFFRACTION STUDIES OF ALIGNED POLYFLUORENE THIN FILMS

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ABSTRACT

We present the overall structural picture of poly(9,9-bis(2-ethylhexyl)-fluorene-2,7-diyl) (PF2/6) in aligned thin films on a rubbed polyimide substrate[1-3] .This comprises molecular and self-organized intramolecular structure, the types of crystallites and oveall alignment as well as the surface morphology.

We also show how this picture can be modified by varying the molecular weight.

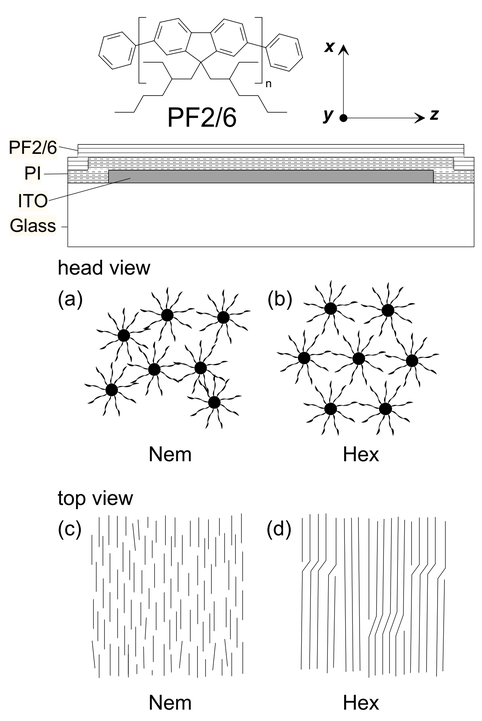

FIG. 1. Above: PF2/6 and the alignment method. Below: A head view or nematic and hexagonal phases (a-b). A top view after alignment (c-d) (not to scale).

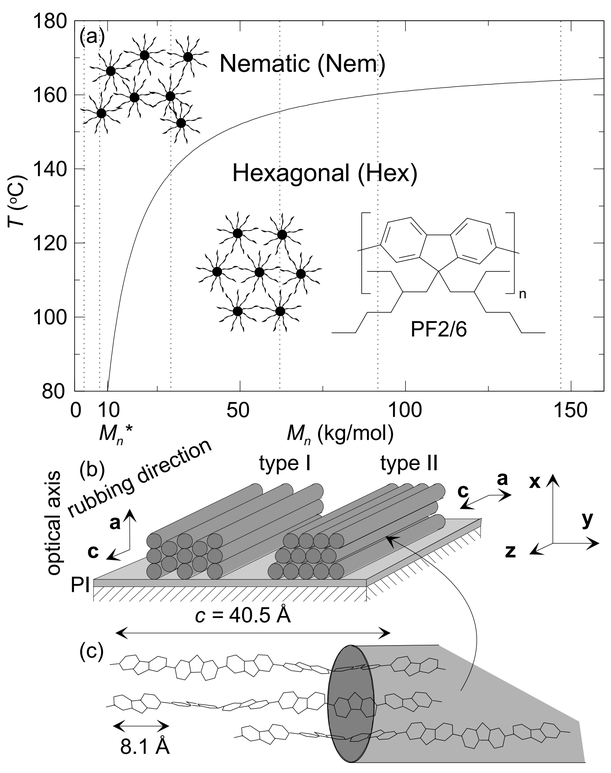

FIG. 2. (a) The phase diagram of PF2/6 as a function of molecular weight (M_n). (b) Self-organized crystallite types I and II. (c) Molecular structure.

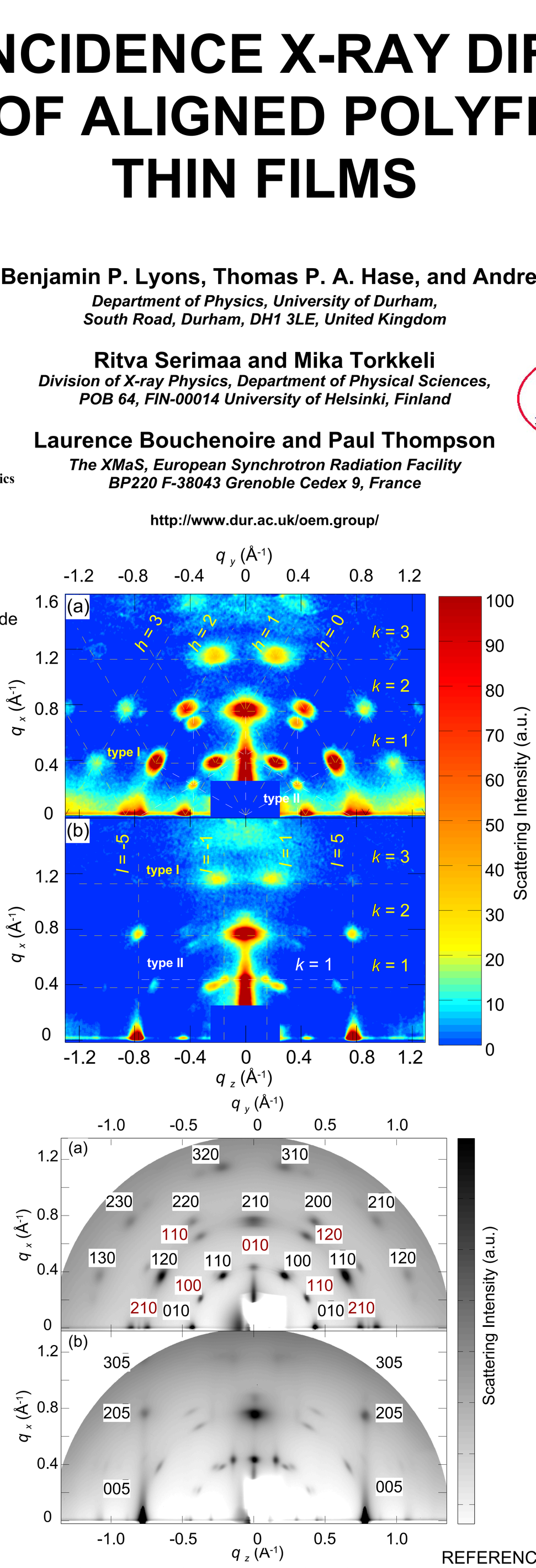

FIG. 4. Typical GIXD patterns of PF2/6. Top: M_n=147 kg/mol, Bottom: M_n=29 kg/mol (a) (xy0) plane (b) (x0z) plane Black and red refer to the crystallite types I and II, respectively (cf. Fig. 2.)

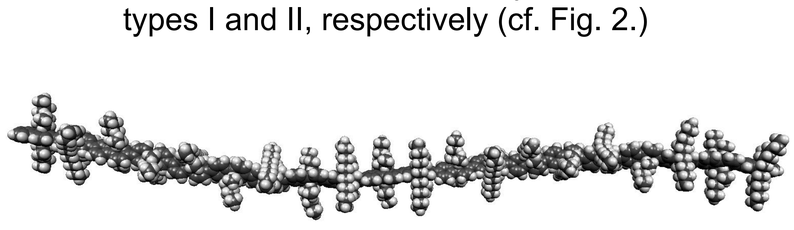

FIG. 3. Molecular mechanics model of a PF2/6 chain.

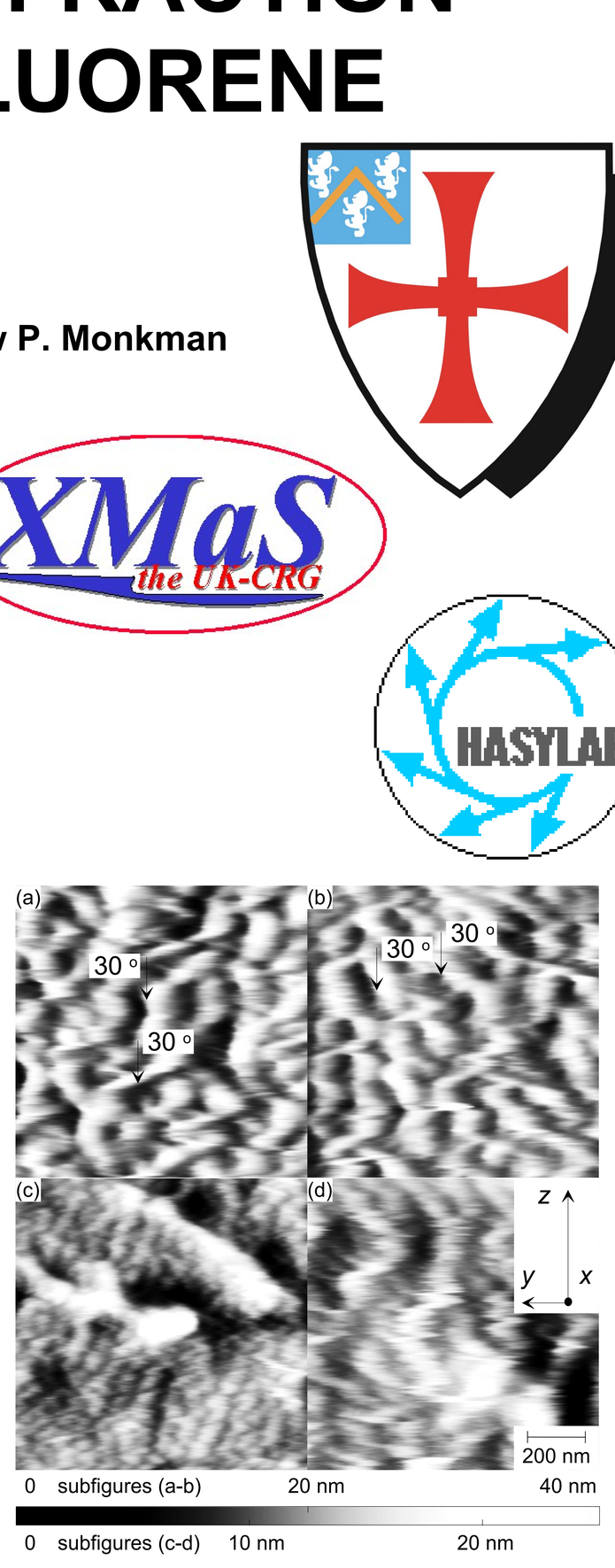

FIG. 5. Typical larger scale morphology of hexagonal PF2/6.

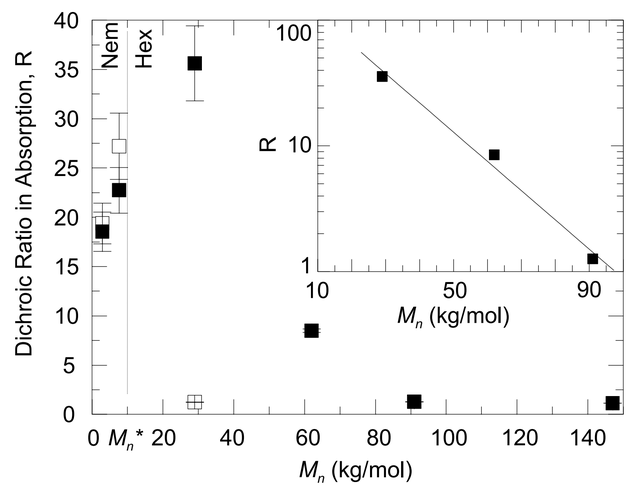

FIG. 6. Dichroic ratio in absorption as a function of molecular weight, when the films were annealed at 80 °C (open squares) or at 180 °C (solid squares).

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