

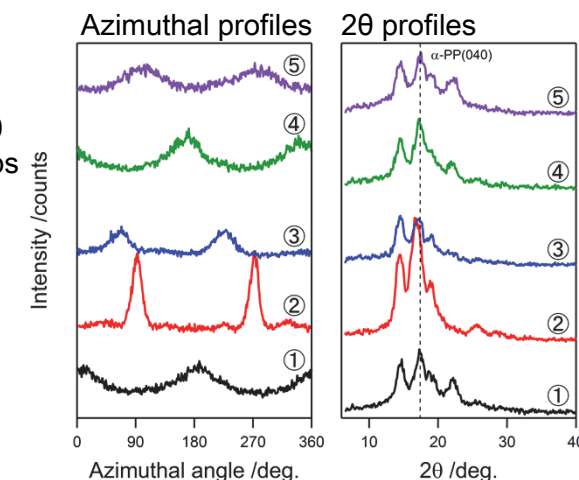
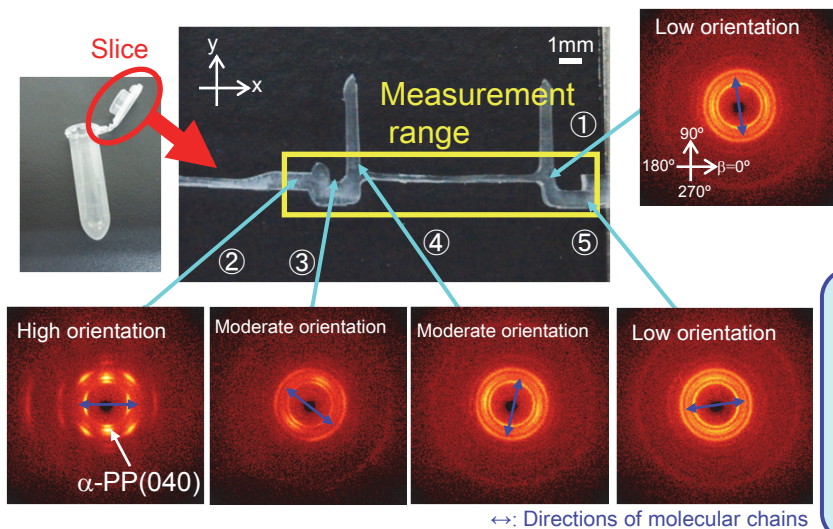
Fine Structure of Polymer Materials by X-ray Diffraction (Mapping Method)

Crystal structure effects various properties of polymer materials, for example strength, heat resistance and fragility. Micro-X-ray diffraction measurement is a useful tool to identify position dependencies of crystalline and orientation of the materials for improving manufacturing processes and clarifying trouble factors.

Mapping Measurements and Crystal Structural Analysis on Polypropylene (PP) Molding

Sample: Cap of polypropylene tube

Wide-angle X-ray diffraction measurements (beam size: 100 $\mu\text{m}\phi$) were carried out on various positions of sample with steps of 500 μm horizontally and 200 μm vertically, respectively.



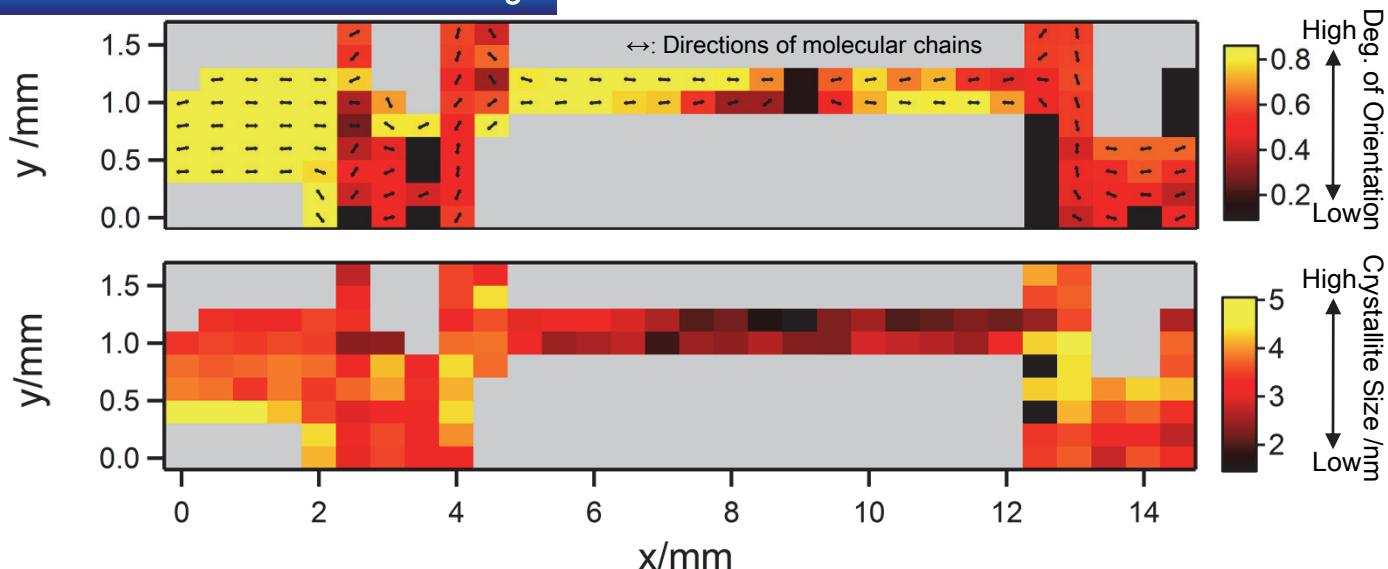
Azimuthal profiles: Azimuthal intensity distributions along α -PP(040) rings.

- Azimuth Directions from peak positions.
- Degree of Orientation from peak width.

2θ profiles: Radial intensity distributions in a direction to α -PP(040) spots.

- Crystallite Size from peak position and width.

Structural Distribution of PP Molding



Generally, the places, where crystalline and orientation are high and directions of molecular chains change drastically, are likely to break easily.

Mapping analysis of fine structure of polymer material is useful to identify the possible fracture mechanism of the molding resin.