Application Note POLYMER002

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POLYMER002:Transmission 2D-WAXS/SAXS Multi-Scale Analysis of Plastic Materials

Introduction

The performance of resins and films is greatly influenced by their multi-level internal structures, such as crystal lattices and lamellar structures. However, these structural differences are not visible to the naked eye, making it difficult to make design decisions. By combining transmission 2D-WAXS and SAXS, it is possible to visualize everything from crystallinity to orientation state at once and quantitatively understand the structural differences.

Crystal phase analysis

Analysis:	Raw and Intermediate materials
Analyzed materials:	Polyethylene
Use:	Material development

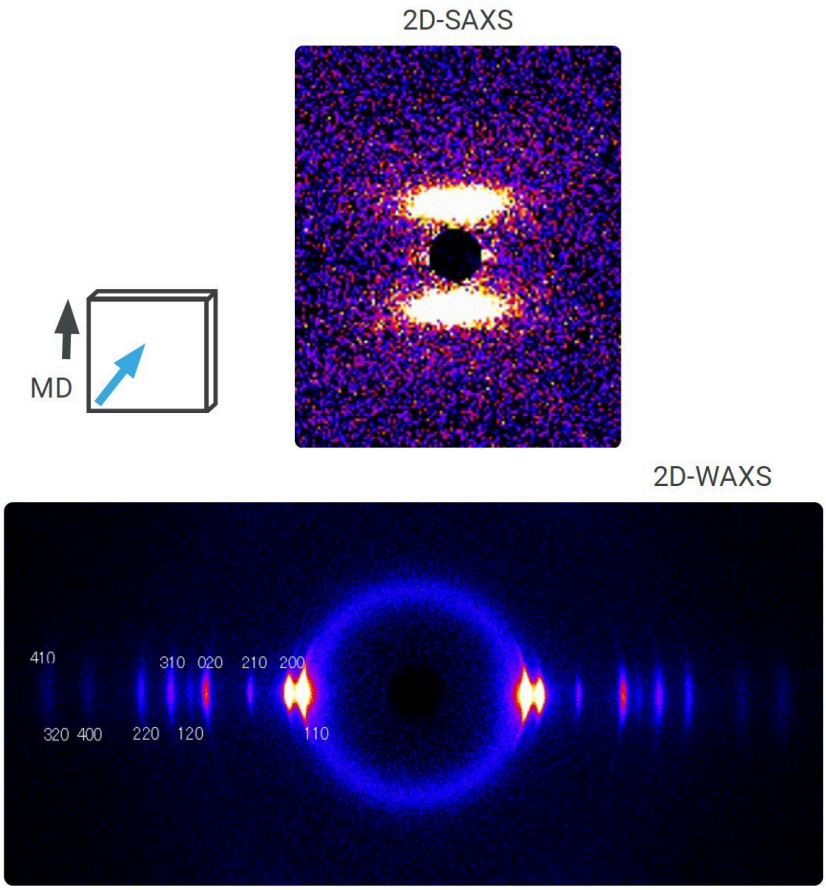

Figure 1: Transmission 2D-WAXS/SAXS measurements of polyethylene

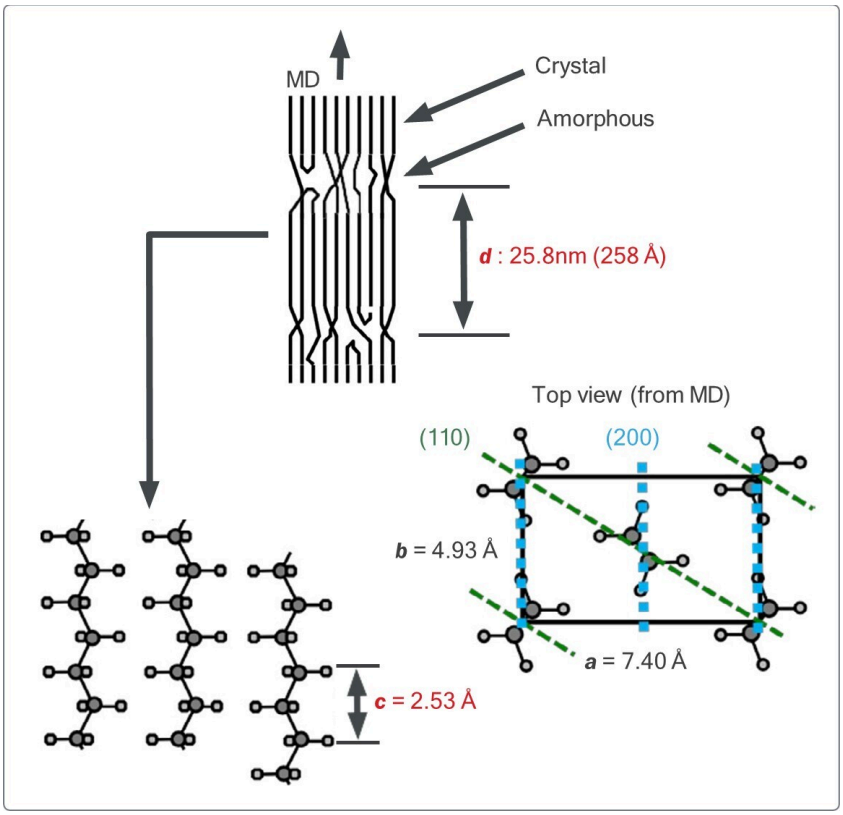

Figure 2: Schematic diagram of calculation results

Conclusion

Transmission 2D-WAXS and SAXS measurements were performed on polyethylene to simultaneously obtain information on the crystal lattice and lamellar structure as shown in Figure 1. From the obtained profiles, we can proceed with the analysis and calculate the face spacing and lattice constant as shown in Figure 2. As shown above, this method enables nondestructive and quick analysis of the multilevel structure inside the resin, and is effective for clearly identifying structural changes that cause differences in molding conditions and physical properties.

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