contact line (TCL) influences the alignment of polymer backbone and hole mobility. Such findings enable us to control molecular packing for polymer TFT. (Reported by Fang-Ju Lin, National Taiwan University)

This report features the work of Chain-Shu Hsu, Huan Liu and their co-workers published in Adv. Mater. ***29****, 1606987 (2017).*

TLS 01C2 SWLS – X-ray Powder Diffraction

- GIWAXS
- Materials Science, Thin films, Soft Matter, Polymer

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Handedness of Twisted Lamellae in Banded Spherulite

Systematic study of the helicity of twisted lamellae in the banded spherulite of chiral polylactide

In this article, we present important work of Rong-Ming Ho (National Tsing Hua University)[1] and his coworkers, which demonstrates a systematic study of a banded spherulite resulting from lamellar twisting due to imbalanced stresses at oppositely folded surfaces for isothermally crystallized chiral polylactides and their blends with poly(ethandiol) (PEG). The handedness of the twisted lamella in banded spherulite was determined with a polarized-light microscope (**Fig. 1**). With the same growth axis along the radial direction evident from micro-beam wide-angle X-ray diffraction (WAXD) of isothermally crystallized samples at various temperatures (**Fig. 2**), the twisted lamellae of chiral polylactides (poly(L-lactide) (PLLA) and poly(D-lactide) (PDLA)) display opposite handedness. The split-type Cotton effect on the C=O stretching motion of vibrational circular dichroism (VCD) spectra serves to determine the helix handedness (*i.e.*, conformational chirality) (**Fig. 3(a)**). The results indicate that the conformational chirality can be defined by the molecular chirality through intramolecular chiral interactions. Moreover, the preferred sense of the lamellar twist in the banded spherulite corresponds with the twisting direction identified in the C–O–C vibrational motion of VCD spectra, reflecting the role of intermolecular chiral interactions in the packing of polylactide helices (**Fig. 3(b)**). Similar results were obtained in the blends of chiral polylactides and polyethandiol (PEG, a polymer compatible with polylactide), indicating that the impact of chirality is intrinsic regardless of the particular crystallization conditions. In contrast to chiral polylactides, the

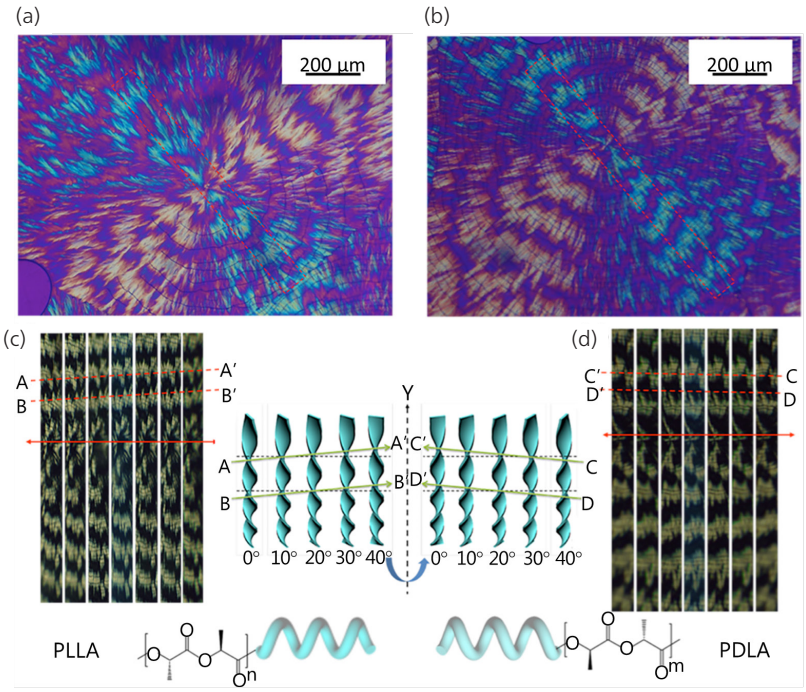

Fig. 1: Observation of banded spherulites of (a) PLLA and (b) PDLA isothermally crystallized at 110 °C with a polarized-light microscope (PLM) and a gypsum plate. Vertical sections (red delimited rectangular areas in (a) and (b)) of (c) PLLA and (d) PDLA spherulites examined with PLM. The sample was rotated along the *y* axis in the right-handed positive sense during the PLM observation. [Reproduced from Ref. 1]

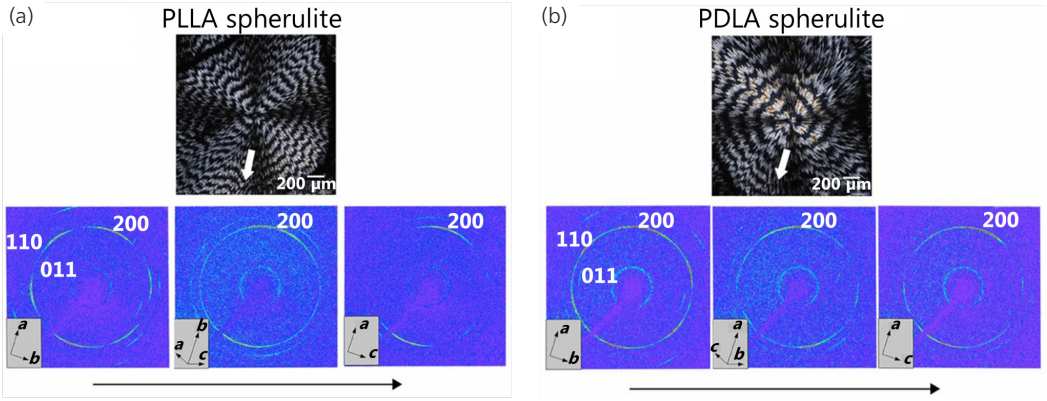

Fig. 2: Micro-beam WAXD two-dimensional patterns of a banded spherulite for PLLA (a) and PDLA (b) isothermally crystallized at 130 °C from a melt. [Reproduced from Ref. 1]

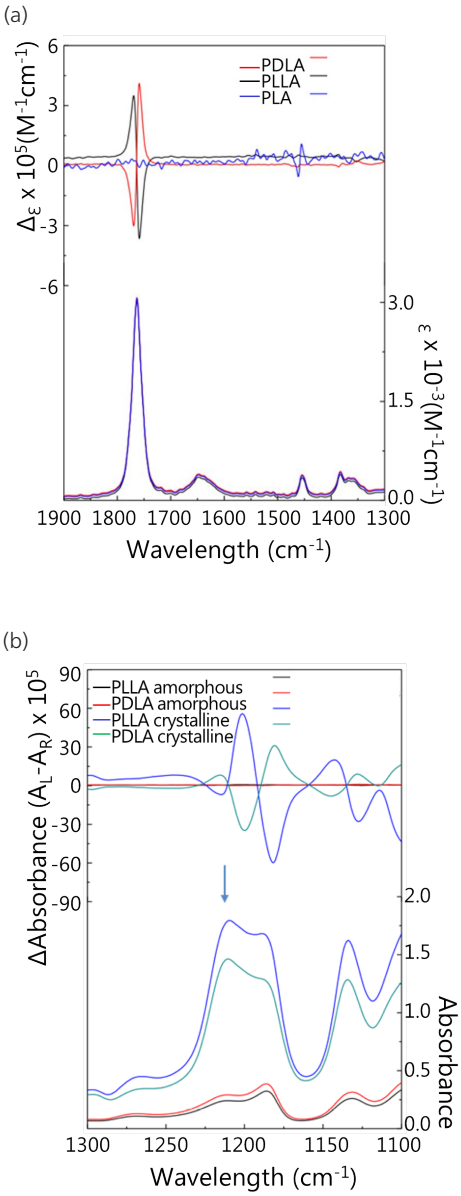

Fig. 3: (a) VCD and corresponding FT-IR absorption spectra of polylactides in dilute CH_2Cl_2 solution (concentration 2 wt%). VCD and corresponding FTIR absorption spectra of (b) C–O–C vibrations of PLLA and PDLA in the amorphous and crystalline states isothermally crystallized at 110 °C for 6 h. [Reproduced from Ref. 1]

spectrum of the crystalline stereocomplex that associates PLLA and PDLA shows VCD silence. The spectral results are consistent with the morphological observations. No banded spherulites were observed in the stereocomplex crystallites because of the symmetric packing of mirror L- and D- chain conformations in the fold surfaces and the crystallite core. (Reported by Hsiao-Fang Wang, National Tsing Hua University)

*This report features the work of Hsiao-Fang Wang, Ming-Chia Li, Rong-Ming Ho, and their co-workers published in Macromolecules **50**, 5466 (2017).*

TPS 25A Coherent X–ray Scattering
TLS 07A1 IASW X–ray Scattering

- Microbeam Wide-Angle X-ray Diffraction
- Material Science, Soft Matter, Polymer Physics

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