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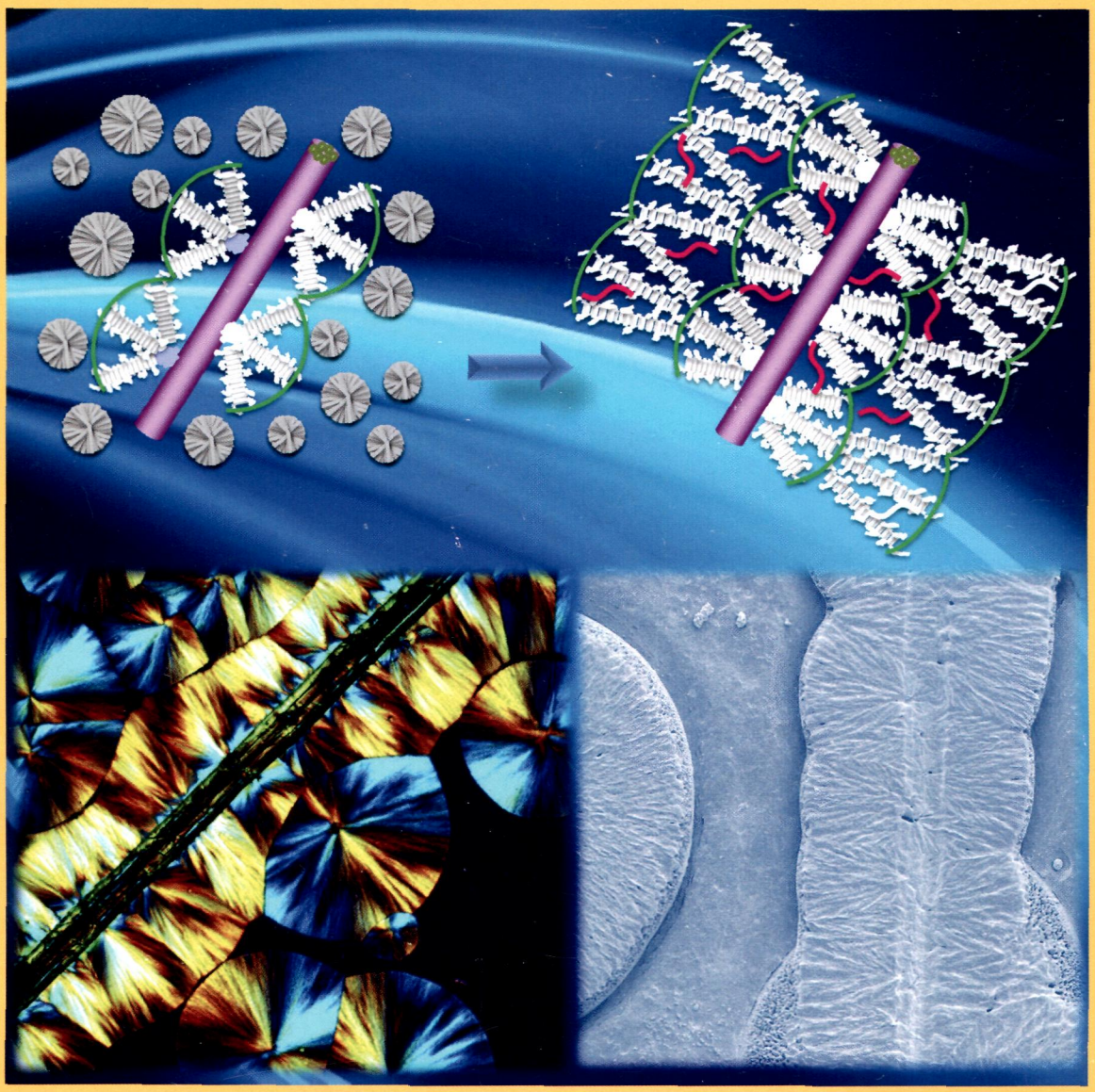

Strong Transcrystalline Layers Formed in Poly(L-lactic acid) Biocomposites with an Accelerator of Chain Mobility (see page 5A)

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ON THE COVER: Strong transcrystalline layers formed in poly(L-lactic acid) biocomposites with an accelerator of chain mobility. Formation of the transcrystalline layer probably enhances the interfacial adhesion of poly(L-lactic acid) (PLLA)/natural fiber biocomposites, as confirmed by this work. It was of great interest to reveal that a crystallization accelerator, poly(ethylene glycol) (PEG), enabled the PLLA chains' desirable mobility and, thus, enhanced the transcrystallization kinetics induced by ramie fibers. The direct observation of polarized optical microscopy during isothermal crystallization suggested that large-sized transcrystallinity (TC) featured by impressive growth rates was produced after adding PEG. It could be exemplified by the case at 125 °C, the growth rate of TC developed in PLLA10 (containing 10 wt % PEG) achieved 6.1 μm/min, which was nearly triple that of pure PLLA (2.1 μm/min). Another desirable feature distinguishing the modified system from pure PLLA is that spherulitic nucleation's proceeding was largely restricted because it was difficult to fulfill the critical size for stable nuclei due to the increased chain mobility. Meanwhile, combining the effective nucleation activity of the ramie fibers and the acceleration merits of PEG offered the chance to form the prevailing TC texture instead of the rich spherulites that dominate in pure PLLA. The local structure (including the lamellar structure and molecular orientation) of transcrystalline layers was further determined, which indicated that the TC presented the α crystal form and random lamellar packing derived from the moderate nucleating ability. Importantly, the single fiber reinforced composite samples containing the prevailing TC textures achieved remarkably higher interfacial strength compared with that of pure PLLA samples with poorly developed transcrystalline layers. See page 812.

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