

Control of Nanostructured Morphology of Poly(L-lactide) in Multiphase Polymer Systems

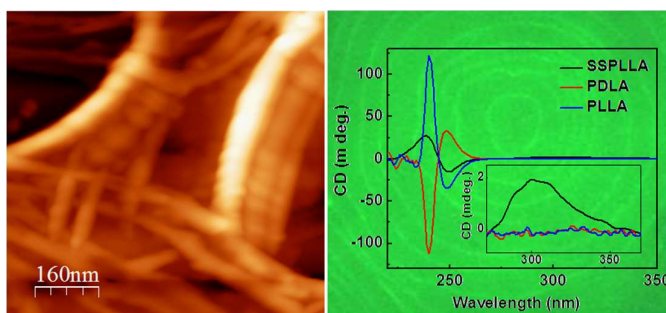
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The introduction of crystallizable blocks in block copolymers control the solid state structure and generate fascinating morphologies due to the complex interplay between microphase separation and crystallization. In the first part of the talk, the structural evolution of poly(L-lactide) (PLLA) during heating of the amorphous ABA triblock copolymers will be discussed. For that purpose, two triblock ABA copolymers poly(L-lactide-*b*-dimethylsiloxane-*b*-L-lactide) (PLLA-*b*-PDMS-*b*-PLLA) and poly(L-lactide-*b*-ethylene glycol-*b*-L-lactide) (PLLA-*b*-PEG-*b*-PLLA) containing poly(L-lactide) were synthesized. Upon heating of the glassy triblock copolymers, the amorphous PLLA transiently transformed to the mesophase just above the T_g of PLLA block before crystallizing into the regular α form.^[1-2] The formation of the mesophase was clearly faster in miscible triblock copolymers due to the enhanced molecular mobility of the amorphous PLLA. In the second part of the talk, the role of morphology and the polymer chain packing on the solid state emission properties of the star-shaped PLLA will be discussed.^[3]



Last part of the talk highlights the structure and morphology (superstructure) of the solvent-induced crystallized PLLA films in different length scales using wide-angle and small-angle X-ray scattering, atomic force microscopy, and polarized light microscopy.^[4,5] In addition, mechanism of co-crystal formation of PLLA with solvents and solvent desorption process from the co-crystals during heating will be discussed.

References:

- [1] S. Nagarajan, K. Deepthi, E. B. Gowd, *Polymer* **2016**, *105*, 422.
- [2] S. Nagarajan, E. B. Gowd, *Macromolecules* **2015**, *48*, 5367.
- [3] S. Nagarajan, E. B. Gowd, *Macromolecules* **2017**, *50*, 5261.
- [4] P. Shaiju, N. S. Murthy, E. B. Gowd, *Macromolecules* **2016**, *49*, 224.
- [5] P. Shaiju, N. S. Murthy, E. B. Gowd, *Soft Matter* **2018**, *14*, 1492.