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Alignment of Fatty Acid-Derived Triblock Copolymers under Large Amplitude Oscillatory Shear WENYUE DING, SHU WANG, University of Houston, SAMEER KESAVA, ENRIQUE GOMEZ, The Pennsylvania State University, MEGAN ROBERTSON, University of Houston — Linear ABA triblock copolymers find widespread utilization as thermoplastic elastomers (TPEs): materials which exhibit elastomeric behavior at room temperature and can be readily processed at elevated temperatures. Traditional TPEs are derived from fossil fuels; however, the finite availability of petroleum and the environmental impact of petroleum processing has led to an increased interest in developing alternative sources for polymers. Vegetable oils and their fatty acids are promising replacements for petroleum sources due to their abundance, low cost, lack of toxicity, biodegradability and ease of functionalization that provides convenient routes to polymerization. In this study, triblock copolymer TPEs were synthesized containing lauryl and stearyl acrylate, derived from fatty acids found in vegetable oils. Small-angle X-ray scattering experiments revealed highly aligned triblock copolymer morphologies after the application of large amplitude oscillatory shear. The temperature and frequency dependence of the degree of alignment was investigated. In contrast to prior studies on shear-aligned morphologies in bulk and thin film block copolymers, hexagonal close packed and face centered cubic spherical structures were observed.

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