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Parallel Carbon Nanotube Stripes in Polymer Thin Film with Tunable Microstructures and Anisotropic Conductive Properties

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Abstract

It is known that shear-flow can induce units to assemble into vorticity-aligned stripe-structures in confined geometries. This study shows that the microstructure and the property of the stripe in polymer thin film can be well tuned by adjusting the viscosity ratio between dispersed phase and continuous phase. Polypropylene (PP)/poly(styrene ethylene/butadiene-styrene) (SEBS)/octadecylamine functionalized multiwalled carbon nanotubes (ODA-MWCNTs) composites with different viscosity ratios were prepared by either pre-compounding ODA-MWCNT into PP or SEBS in a microcompounder. Under the induction of shear-flow, ODA-MWCNT and SEBS spontaneously assembled into vorticity-aligned stripes in PP thin films for all the composites with different viscosity ratios, resulting in the property of conductive anisotropy for the film. Interestingly, it was found that both the microstructures and the

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