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Molecular Structure of Semicrystalline Polyethylene Blends Studied by Broadband Coherent Anti-Stokes Raman Scattering Microscopy YOUNG JONG LEE, CHAD SNYDER, AARON FORSTER, MARCUS CICERONE, WEN-LI WU, National Institute of Standards and Technology —
Blends of polyolefins have been widely used to diversify and improve material properties and to avoid complications that exist in blending immiscible heterogeneous polymers. The properties of a blend quite often deviate from predicted ones with the linear combination of its constituent homopolymers or copolymers, likely due to microscopic phase separation and differing degrees of crystallization. However, the current measurement techniques for studying the structure of polyolefin blends are primarily based on bulk averaging methods such as calorimetry or neutron scattering or through solvent extraction of a lower melting component. As a result, development of new blends depends on mostly empirical approached, not based on microscopic structural information. We demonstrate here that a noninvasive imaging technique, based on coherent anti-Stokes Raman Scattering (CARS) microscopy, can provide microscopic structural information of a bimodal polyethylene blend. We discuss new findings of the spatial distribution of species with different molecular architectures and the orientation of their semicrystalline structures.

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