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Influence of Physical Aging on the Mechanical Properties of a Random Polypropylene-Polyethylene Copolymer SAMUEL AMANUEL, Materials Science and Engineering, XIAOFENG CHEN, Chemical and Biological Engineering, RAHMI OZISIK, SANFORD S. STERNSTEIN, Materials Science and Engineering, Rensselaer Polytechnic Institute — Spontaneous aging of a random polypropylene-polyethylene copolymer was studied at 50 ^{o}C above its glass transition temperature using differential scanning calorimetry, wide (WAXS) and small (SAXS) angle X-ray scattering, and dynamic mechanical relaxometry. Both the melting temperature and melting enthalpy of the copolymer increased with physical aging time at room temperature suggesting increased crystallinity. WAXS measurements also indicated an increase in crystallinity along with coexistence of γ and α forms for highly aged samples. Dynamic mechanical measurements showed that the shear storage modulus increased uniformly at all frequencies of measurement from 0.1 Hz to 20 Hz. Furthermore a direct correlation was observed between the storage modulus and the melting enthalpy of the copolymer. Conversely, the change in shear loss modulus was frequency dependent, with larger changes at 20 Hz than at 0.1 Hz. This suggests that there are changes in the relaxation time spectra with aging. The aging process will be explored in more detail using both the SAXS and stress relaxation data.

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