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The Double Yielding Phenomenon in Polyethylene

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Several specimens of low density polyethylene (LDPE) were prepared using compression molding and mechanically tested at room temperature. Unlike high density polyethylene polymers (HDPE), the tensile tests of LDPE showed a broad yielding behavior known as double yielding. The double yielding observations in LDPE and linear low density polyethylene (LLDPE) have been reported by several authors. The effect of specimen preparation and testing conditions, such as strain rates and temperature, were also reported. However, the appropriate mechanism of the double yielding phenomenon has not been resolved. The purpose of this paper is to explain the phenomenon of the double yielding in LDPE based on crystallization development during the deformation process of the polymers. The results will show that the molecular mobility and crystallization propagation during the deformation of LDPE specimen is the main reason behind the appearance of the double yielding.