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Correlation between Different Microstructural Parameters with Tensile Modules of Various Polyethylene Blown Films

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The physical and mechanical properties of polyethylene are known to be strongly influenced by morphology and structural parameters, such as molecular orientation, size, shape and characteristics of crystalline domains, so this work will be devoted towards fundamental understanding the structure-property relationships. The objective is to establish a model for predicating tensile properties using various types of polyethylene (LLDPE, HDPE, and LDPE) at different process condition in the film blowing process. The microstructural parameters were determined by DSC, wide angle X-ray diffraction pole figures, SAXS technique and birefringence measurements. A model for the tensile modulus is suggested and correlated to the PE film structural parameters including crystallinity, lamellar thickness, crystal size, the average length of the crystal layer, long spacing and orientation factors for crystalline c-axis and amorphous phase. The results show there is a reasonable relation between the measured modulus and calculated one.