Polyolefins

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Processing, Structure Development, and Properties

Vorwort

Preface

Polyolefins, i.e., the polymers synthesized from olefinic monomers, are the major commercial thermoplastics. They are also important components of major thermoplastic elastomers. Polyethylene and polypropylene are the two largest thermoplastics in volume and are fabricated into filaments, films, and molded parts.

The book treats the history, commercialization, characterization, and crystallography of various commercial polyolefins and polystyrenes and describes development of structure during fabrication of these polymers into various shapes. It is in this latter area that this book is unique. No other volume describes the structuring of molten polyolefins in fiber, film, and molding processes with correlations between structural order such as crystalline unit cell, polymorphic effects and orientation with processing parameters.

We have incorporated polystyrene into this book although it is not classified as a polyolefin, but rather as an aromatic vinyl polymer. The structure and behavior of its isotactic and syndiotactic forms are similar to those of the corresponding polyolefins and help the drawing of conclusions. Atactic polystyrene vitrifies into a glass (solidified melt) and lets us know the fundamentals of structuring in polymers prior to crystallization in polymer processing operations.

Throughout the book we made direct comparisons of the structure and behavior of polyethylene, isotactic and syndiotactic polypropylenes, isotactic polybutene-1, isotactic poly(4-methyl pentene-1), and the different polystyrenes. This book should be of interest to engineers, chemists, and technologists working with polyolefins.

The book was written while both authors were affiliated with the Department and Institute of Polymer Engineering at the University of Akron.

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