Abstract Template

Comparing Analysis of Recycled and Virgin PET Melt-Spun Fibers

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Abstract

Five different Poly (ethylene terephthalate) (PET) materials (two recycled and three virgin ones) were melt-spun into fibers using a capillary rheometer and aerodynamic stretching. Two processing temperatures in combination with six different take-up pressures were used during the melt spinning process. The spinnability (evaluated by the homogeneity and drawability), and surface morphology smoothness of fibers, and the mechanical properties of fibers were investigated. As a result, ***rPET-B*** (rPET means recycled PET) and ***vPET-1*** (vPET means virgin PET) were evaluated as the most suitable material for melt spinning from the recycled and virgin PET, respectively. Compared with other research, the melt-spun PET fibers in this study achieved satisfactory tenacity, outstanding elongation at break and a desirable denier. Additionally, the performance and reliability of the PET fibers from ***rPET-B*** and ***vPET-1*** were discussed using Weibull modulus as shown in Figure 1.

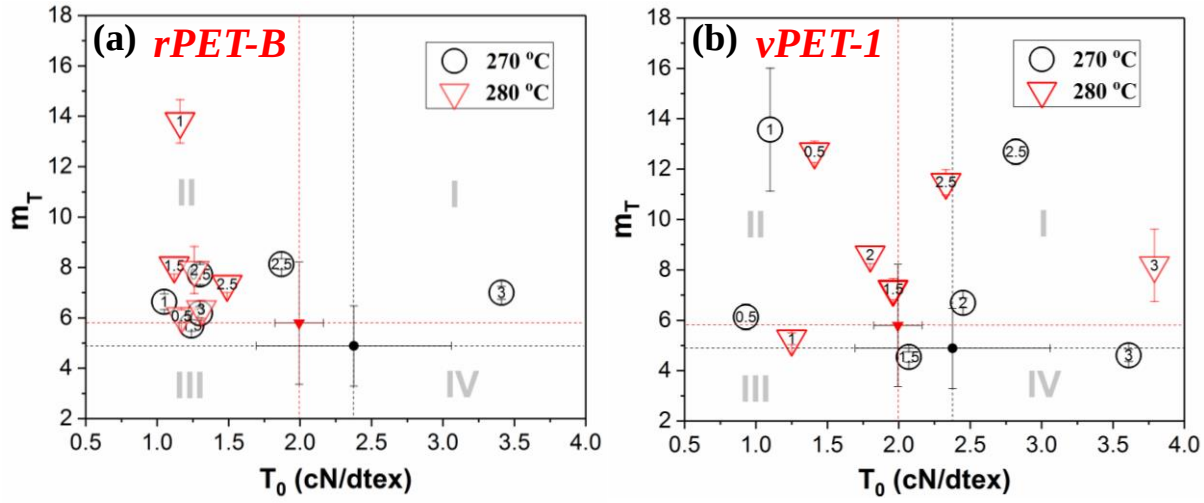


Figure 1. Plots of the Weibull modulus m_T over the characteristic tenacity T_0 for rPET-B (a) and vPET-1 (b) fibers. The number embedded into the symbol shows the take-up pressure (bar). Defining the average values from three virgin PET (solid black circle: 270 °C, 2.0 bar; solid red triangle: 280 °C, 2.0 bar) as the reference points, quadrants can be constructed as shown. With respect to the reference points, specimens located in the quadrant I show an improved performance and reliability, located in the quadrant II correspond to a worse performance but a higher reliability, in the quadrant III indicate a worse performance and lower reliability, and in the quadrant IV show an improved performance but lower reliability.

Keywords— Recycled PET, Melt spinning, Mechanical properties

Professional Biography

Y. Qin has completed her Master Degree from School of Materials Science and Engineering in Zhengzhou University in 2016. During this period, she mainly focused on the development of crystalline morphology and crystal modification evolution of isotactic polypropylene (iPP) under shear flow field, especially the formation mechanism of the shear-induced β-iPP crystals. At present she has been purscing her PhD Degree at the Institute of Polymer Materials of Friedrich-Alexander-University Erlangen-Nuremberg. The research field is to investigate the recycled PET in fiber spinning and rheology, to make an evaluation of potential recovery routes. She has published more than 12 papers in reputed journals.



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Any Comments: