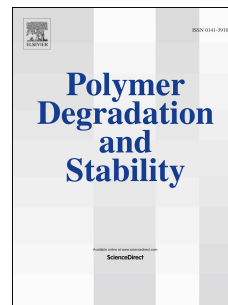


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Internal structure and crystallinity investigation of segmented thermoplastic polyurethane elastomer degradation in supercritical methanol

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Abstract: This work is the first to investigate the internal structure and crystallinity variance of segmented thermoplastic polyurethane elastomer (TPU) degradation in supercritical methanol. Molecular weight distribution (MWD) and molecular structure were determined using GPC, FT-IR and NMR. DSC and XRD were employed to explore the thermal behaviour and morphologic change of TPU, respectively. Results indicated that the segmented TPU has unique degradation behavior because of the three kinds of morphology of hard segments. The short range hard segments dissolved in soft blocks were amorphous. The long range hard segments mixed with and separated from soft blocks formed crystallites. These crystallites ruptured from the soft blocks in initial time period and the soft blocks dissolved in methanol, as indicated by the disappearance of the undecomposed TPU peak in MWDs. The remaining residues were hard segments crystallites which had narrow sharp MWDs. The following process was in two phases. In solid phase, hard segments crystalline structures were destroyed gradually, the melting points decreased correspondingly; in liquid phase, soft segments broken from short range hard segments and fractured.

Key words: internal structure, crystallinity, degradation behaviour, segmented polyurethane, supercritical methanol

1. Introduction

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