

Deformation and failure of semi-crystalline polymers

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DEFORMATION AND FAILURE OF SEMI-CRYSTALLINE POLYMERS

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ABSTRACT

Deformation and failure behaviour of polymers is important for engineering applications. For semi-crystalline polymers, temperature and flow history of processing can influence the type of deformation/failure behaviour. A qualitative distinction in deformation types (see Fig. 1):

- I Homogeneous deformation*
- II Stable neck drawing*
- III Brittle failure*



Fig 1 3 types of deformation/failure of polyethylene.

Figure 1:.

The objective of this study was to rationalize the observed influence of processing conditions on the deformation/failure behaviour. It was found that a) the strain hardening depends on chain entanglement density and orientation, b) yield stress depends on crystallinity/lamellae thickness and c) both can influence the deformation/failure behaviour