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Rheological and Thermorheological Assessment of Polyethylene in Multiple Extrusion Process

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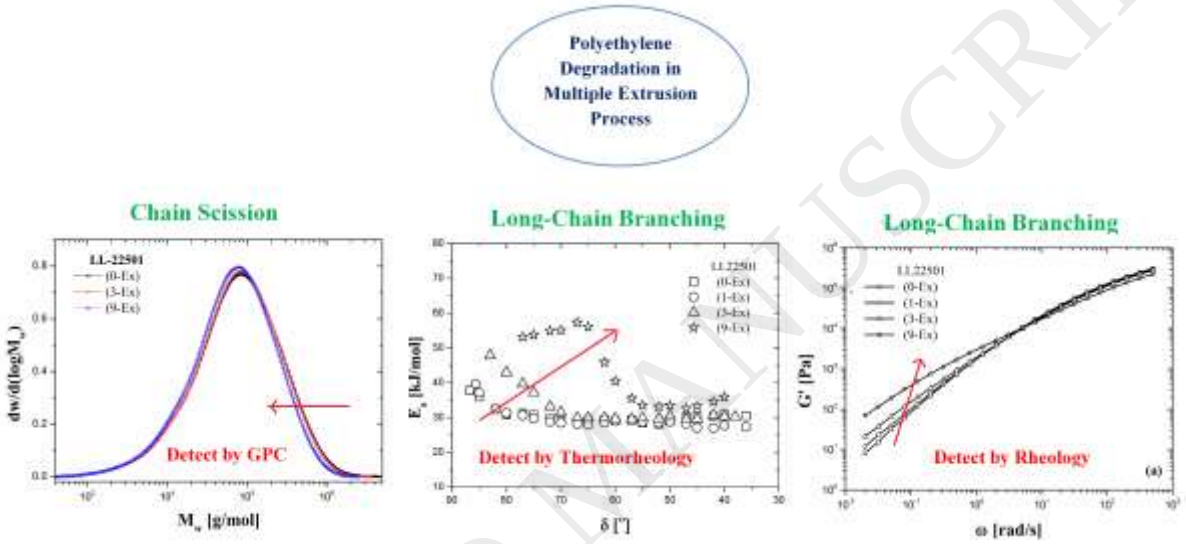
Graphical abstract



Highlights

- The gel content test disclosed that no crosslinking occurred in degraded samples.
- The rheology results revealed the presence of long-chain branching mechanism.
- The GPC results illustrated the predominance of chain scission in degraded samples.
- The antioxidant content had a significant effect on the degradation behavior.
- The effect of the presence of long-chain branches was detected by thermorheology.

ABSTRACT

The relationship between rheological properties and structural changes in polyethylene chains due to the recycling of two linear low-density polyethylenes (LL-A and LL-B) has been investigated. These samples were subjected to multiple extrusion processes (9 extrusion steps). According to the results of gel content experiments, crosslinking did not occur. The results of the gel permeation chromatography indicated that the chain scission was slightly predominant during the re-extrusion, while the rheometry results clearly show the effects of long-chain branching during degradation. Therefore, the degradation proceeded through both paths. Based on the rheological results and the Cole-Cole method,