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## **Structural Evolution Mechanisms During Relaxation of Pre-oriented PEN Films**

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The relaxation behaviour of PEN films upon uniaxial deformation was investigated using a custom made uniaxial stretching machine that allows real time measurement of true stress-true strain and birefringence. In this study, the true stress-true strain and birefringence was tracked during relaxation of cast amorphous PEN films previously stretched at 140°C to a series of deformation levels. The results showed that if a relaxation stage is imposed within the initial linear stress optical regime (observed during stretching) the samples followed the stress optical behaviour during relaxation. If a network structure has formed during stretching, this typically manifests itself as a stress optical behaviour with higher slope, the relaxation stage occurs with rapid increase in birefringence while the stress decreases. If the film has developed substantial level of orientation at large deformations, the relaxation stage accompanies a little or no increase in birefringence.