

A New Infrared Analysis of the Changes in Chain Conformation
of Drawn Nylon 6 Film

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After the band resolution of IR spectrum of nylon 6 films subjected to drawing and annealing under different conditions, the absorption band of each component was identified and its exact absorbance could be obtained. The changes in chain conformation during drawing and annealing were analyzed in terms of the results of IR band resolution.

The results obtained from this study were as follows:

Both 929 cm^{-1} and 1036 cm^{-1} bands could be assigned to α -form trans isomer. 950 cm^{-1} , 960 cm^{-1} , and 1028 cm^{-1} bands were assigned to α -form chain fold. γ -form had absorption bands at 913 cm^{-1} , 974 cm^{-1} , and 1000 cm^{-1} , of which 974 cm^{-1} band was the most intense.

As draw ratio increased, there was a good correlation between absorbance of 929 cm^{-1} band and birefringence.

There was a good linear relationship between absorbance of 929 cm^{-1} band and density, for the same draw ratio. From this correlation, the amorphous density of unoriented specimen was $1.1156(\text{g/cc})$. There was also good linear relationship between absorbance of 980 cm^{-1} band assigned to amorphous region and

density of undrawn annealed specimens. From this correlation the density of unoriented pure crystal was 1.2252 (g/cc). Therefore it could be considered that unoriented crystal consisted of 7% γ -crystal(density 1.16g/cc) and 93% α -crystal(density 1.23g/cc).