Structural Reorganization of a Highly Drawn VDF/TrFE Copolymer in an Electric Field

Kap Jin Kim, Nicholas M. Reynolds*, and Shaw L. Hsu*

Dept. of Textile Eng., Kyunghee Univ., Seoul
*Polymer Sci.& Eng. Dept., Univ. of Massachusetts, Amherst Massachusetts, USA

A spectroscopic study has been carried out to analyze electric field induced microstructural changes in a highly drawn 75/25 VDF/TrFE copolymer. Factor analysis in conjuction with the ratio method was used. The spectroscopic features obtained suggest that amorphous and crystalline regions in the drawn sample have similar chain conformation distributions as compared to the isotropic samples. Orientation of chain segments and functional groups can be calculated using dichroic ratios associated with specific vibrations. In the presence of an electric field of 1.0 MV/cm, we found an increase in the relative fraction of long trans segments, and an irreversible change in the orientation distribution of dipoles from 47° to 54° with respect to the film plane.