



**EFFECTS OF TEMPERATURE AND STRAIN RATE ON STRESS VERSUS BIREFRINGENCE
BEHAVIORS DURING UNIAXIAL STRETCHING OF CYCLO-OLEFIN COPOLYMER FILMS**

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The purpose of this study was to clarify the stress versus birefringence behaviors of cyclo-olefin copolymer (COC) films during uniaxial stretching and relaxation processes. Particular attention was paid to the behavior near the glass transition temperature. The linear relation between stress and birefringence was found at temperatures sufficiently higher than the glass transition temperature (T_g), indicating that the polymers were in a rubbery state. On the other hand, the stress versus birefringence relation recorded during the stretching and relaxation processes started to deviate from the stress-optical rule and showed hysteresis curves by lowering the temperatures closer to T_g . This behavior is regarded as an intermediate state between rubber and plastic. A part of the hysteresis curve corresponding to the middle region of relaxation was found to be distorted when the measurement was conducted at temperatures close enough to T_g and at high strain rates. This behavior appeared to be the unique characteristics of the COCs studied in this experiment..