

## **On-line measurement of birefringence development during stretching of cyclo olefin copolymer films**

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Cyclo olefin copolymer (COC) is copolymerized from norbornene and ethylene using a metallocene catalyst. COC possesses excellent properties from the perspective of high refractive index, low moisture, and high rigidity, which are important properties when it is used in optical parts. In addition to that, flow properties and heat resistance of COC can be controlled by changing copolymer content. The purpose of this study is to clarify the stress and birefringence behaviors of different grades of COC films during uni- and bi-axial drawing processes. In the uniaxial drawing, stress-optical coefficient was low at drawing conditions of low temperature and high strain rate, and high at high temperature and low strain ratio. However, stress-optical coefficients were similar in the relaxation process irrespective of the conditions for stretching process. In the sequential biaxial drawing, stress-optical behavior during the first drawing and subsequent relaxation between the first and second drawing was nearly same as uniaxial drawing. On the other hand, stress-optical behavior during the second drawing and subsequent relaxation was different from uniaxial drawing. It was found out that the structure development behavior at the second drawing was much more influenced by the structure which was formed during the first stretching.