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Scattering Light Interference from Liquid Crystal Polymer Dispersion Films

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Abstract

The Quetelet-type ring pattern is observed in liquid crystal polymer dispersion (LCPD) films. The clusters of the polymer network and liquid crystal (LC) domains with different director axes in the LCPD films serve as scatterers. Cells with unidirectional and multidirectional rubbings are fabricated. Experimental results show that the polarization of incident light, the applied voltage and the ambient temperature significantly affect the ring intensities. However, the contribution of the LC domains is not evident until the voltage is applied. Finally, rubbing the cells in multiple directions reveals that measurement of the Quetelet-type ring intensity can be used to readily identify the orientation of the liquid crystals. This finding also reveals that the LCs in an LCPD mixture are aligned closer to the final rubbing direction than are pure LCs in a multidirectional rubbed cell. A simple model was proposed to explain the observations.