

Title: Structural Color and Iridescence in Transparent Sheared Cellulosic Films

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Abstract: Shear transparent cellulose free-standing thin films can develop iridescence similar to that found in petals of the tulip Queen of the Night. The iridescence of the film arises from the modulation of the surface into bands periodically spread perpendicular to the shear direction. Small amounts of nanocrystalline cellulose (NCC) rods in the precursor liquid-crystalline solutions do not disturb the optical properties of the solutions but enhance the mechanical characteristics of the films and affects their iridescence. Smaller bands periodicity, not affected by the NCC rods, slightly deviated from the shear direction is also observed. NCCs are crucial to tune and understand the film's surface features formation. Our findings could lead to new materials for application in soft reflective screens and devices.

Author Keywords: Cellulose free-standing films; Iridescence; Liquid-crystalline polymer solutions; Nanocrystalline cellulose rods; Structural colors

KeywordsPlus: Liquid-crystalline solutions; Atomic-Force microscopy; Hydoxypropycellulose films; Nanocomposite materials; Optical-properties; Alignment Layers

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