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Relaxation of wrinkles: A new viscoelastic metrology[1] KAMIL TOGA, NARAYANAN MENON, THOMAS RUSSELL, University of Massachusetts, Amherst — The relaxation of a wrinkle pattern can be exploited as a viscoelastic metrology. We used spin-coated polystyrene (PS) films (thickness ranging from 69 to 299 nm) that were floated on the surface of water. Viscoelastic behavior is introduced to the film by depressing the glass transition of PS with a soluble plasticizer, dioctyl phthalate. Wrinkle patterns are formed by placing a small droplet (1μL) at the center of the floating disc. Due to the differential tension generated across the film, radial wrinkles form around the drop where the compressive axial force buckles the membrane. Thereafter, length of the wrinkles decays, and so does their wavelength. Stress and strain exerted by the droplet can be measured as a function of the size of the wrinkles. Hence, extensional slow-rate-viscosity is calculable. We have studied the relaxation of wrinkles as a function of confinement and plasticizer content. Unusual dynamic behavior due to confinement was observed.

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Kamil Toga
University of Massachusetts, Amherst

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