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Classes of morphology of wrinkle patterns in floated polymer[1]
JOOYOUNG CHANG, NARAYANAN MENON, THOMAS RUSSELL, Univ of Mass - Amherst — We have investigated capillary wrinkling on different types (PS, PMMA, and Poly(perfluorobutenylvinylether) known as Cytop^{TM}) and thicknesses (10 nm to 1 μm) of polymer films floated on water. As in our previous work (*Science* 2007, 317(5838), 650-653), a radial wrinkle pattern is induced by a water droplet placed at the center of the floated film. We have now varied the thickness of the film over a larger range than in our previous work, and we observe three distinct types of the wrinkle patterns, regardless of the material used. In the thinnest films, there appear to be two distinct Fourier modes throughout the wrinkle pattern; in intermediate thickness films, there is a single mode in the bulk of the pattern, which shows a cascade to a harmonic of this mode at the contact line of the drop (*Soft Matter*, 2013, 9, 8289-8296); finally, for the thickest films the single mode persists throughout the pattern. Furthermore, we measured the observed wavenumber (N) of the wrinkles against bendability (ε) of the polymer films; N was found to be proportional to the $\varepsilon^{-1/3}$ for the intermediate thickness but crosses over to the $\varepsilon^{-1/4}$ for the thickest films.

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