Self Wrinkling of UV-cured Polymer Films

ALFRED J. CROSBY, DINESH CHANDRA, Department of Polymer Science and Engineering, University of Massachusetts, Amherst — We report the formation of surface wrinkle patterns associated with the curing of polymer films. Taking advantage of a thin layer of liquid on the surface of a polymer film, we swell the underlying substrate-constrained film, resulting in surface wrinkles due to the resulting compressive stress. The wrinkles evolve from isolated dimples at short times to elongated wrinkles with a defined length. The wavelength of the wrinkles is proportional to the film thickness and is stable at long times. The wrinkle amplitude increases with time after curing due to diffusion of the liquid, reaching a state of equilibrium swelling at long times. The characteristic time for amplitude evolution increases with increasing crosslink density.

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