Anisotropic rupture of polymer strips driven by Rayleigh instability

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We demonstrate that the separated polymer strips of micro- and sub-micro-length-scales rupture anisotropically along the strip direction, resulting in the formation of distinctly observable, regularly spaced polymer drops. The wavelength of the polymer drops and the surface tension dependence of the rupture behavior are found to be well represented by a relationship derived on the basis of Rayleigh instability. The period is proportional to the square root of the cross-sectional area of the strip and the proportionality constant depends on the contact angle. The rupture of polymer strips into polymer blocks instead of drops, which result when annealed with physically confining walls in place, is found to be well described by the same relationship.