SUPPLEMENTARY INFORMATION FOR "TRAVELLING WAVES ON PHOTO-SWITCHABLE PATTERNED LIQUID CRYSTAL POLYMER FILMS DIRECTED BY ROTATING POLARIZED LIGHT"

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Supplementary figures

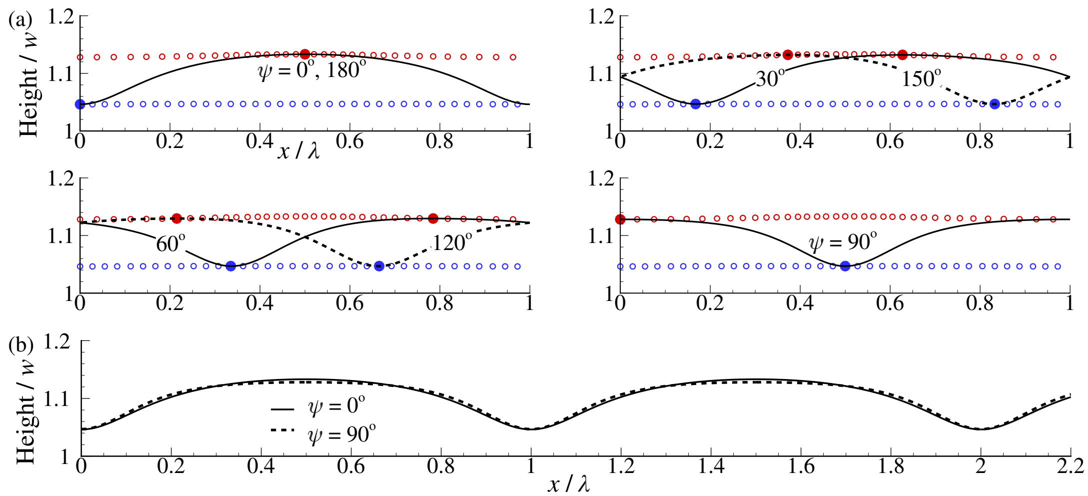

FIG. S1: (a) The normalized surface profiles for various ψ for a film with a wavelength $\lambda/w = 16$, thickness $w = 2d_\mathrm{t}$ and light intensity $(\alpha, \beta) = (5, 0.5)$. (b) Two snapshots of the wave profile for $\psi = 0°$ (solid line) and $90°$ (dashed line, shifted by $\lambda/2$). Due to the much lower mechanical constraints, the surface transformation resembles a peristaltic travelling wave with an almost constant amplitude. The *trans*-to-*cis* conversion status is identical to Fig. 3(a). Movies of the simulations are added in the Supplementary Information (Movies S3 and S4).

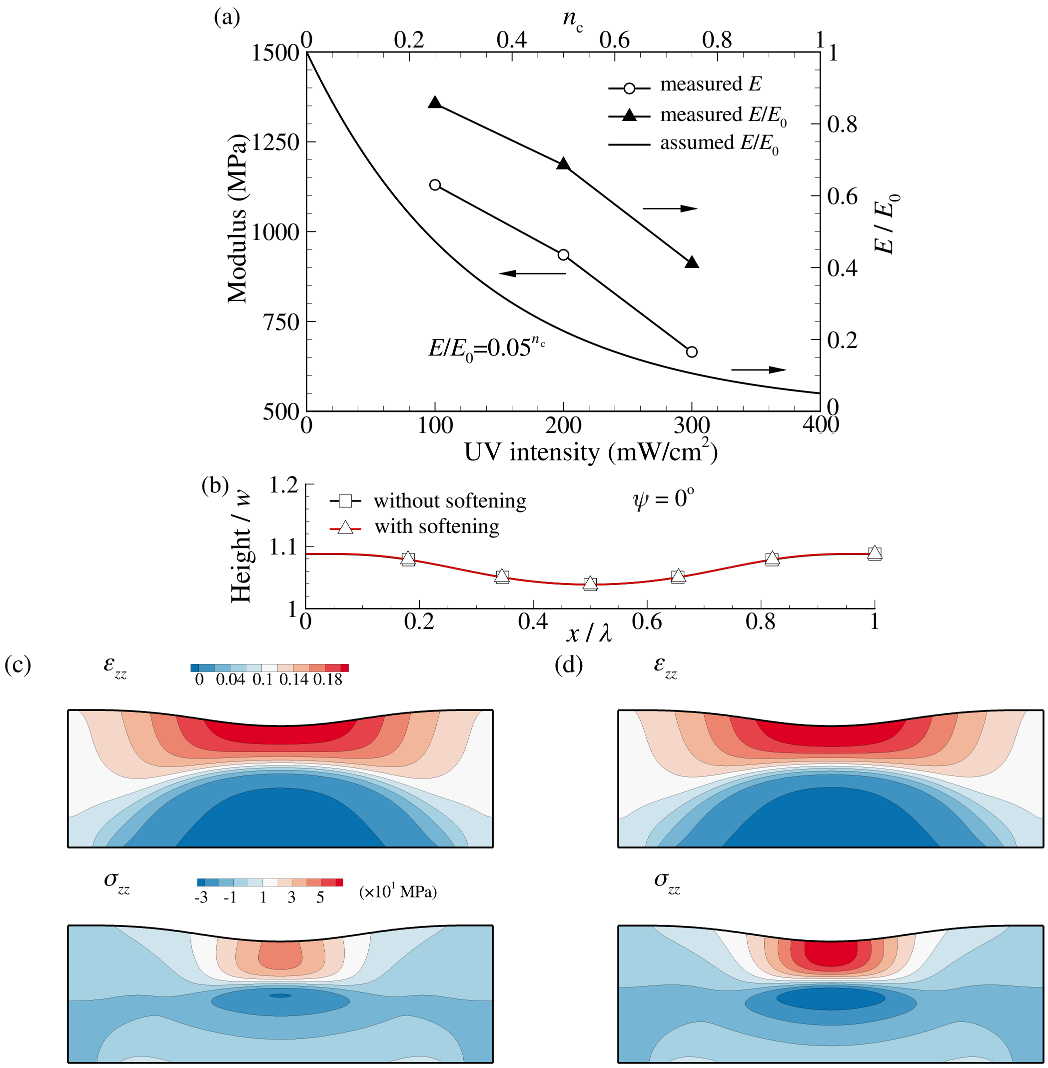

FIG. S2: Effect of photo-softening of azobenzene-modified liquid crystal polymers under large UV light intensity illumination on travelling wave generation. (a) Measured Young's modulus for three different UV light intensities (closed triangles and open circles). The data is cited from Ref. [47]. The assumed model ($E/E_0 = 0.05^{n_c}$) exaggerates the modulus decrease as a function of *cis*-molecule volume fraction n_c. A factor 20 modulus reduction is assumed when all the azobenzenes have transitioned to the *cis* state ($n_c = 1$). (b) Comparison between the surface profiles of a thick film ($w/d_t = 40$, $\lambda/w = 4$ and $\alpha = 10\beta = 40$) at $\psi = 0^o$ with and without considering the photo-softening effect. The difference is negligible. (c)-(d) Contour plots of strain ε_{zz} and stress σ_{xx} for film at $\psi = 0^\circ$ with (c) and without (d) considering the photo-softening effect. The stress developed in (c) is less than in (d) due to the reduced moduli.

Movie captions

Movie S1: 3D Animation of the travelling wave generation on a thin film with $\lambda/w = 4$, $\alpha = 10\beta = 5$ and $w/d_{\mathrm{t}} = 2$. The contour plot on the lateral surfaces shows the *trans*-to-*cis* conversion (n_{c}). The undulating top surface illustrates the wave with aggregated deformations.

Movie S2: 2D Animation of the travelling wave generation on a thin film with $\lambda/w = 4$, $\alpha = 10\beta = 5$ and $w/d_{\mathrm{t}} = 2$. The red and blue hollow circles show the history of the highest and lowest points of the travelling wave, respectively. The current highest and lowest positions for each ψ are highlighted in filled circles.

Movie S3: 3D Animation of the travelling wave generation on a thin film with $\lambda/w = 16$, $\alpha = 10\beta = 5$ and $w/d_{\mathrm{t}} = 2$. The contour plot on the lateral surfaces shows the *trans*-to-*cis* conversion (n_{c}). The undulating top surface illustrates the wave with aggregated deformations.

Movie S4: 2D Animation of the travelling wave generation on a thin film with $\lambda/w = 16$, $\alpha = 10\beta = 5$ and $w/d_{\mathrm{t}} = 2$. The red and blue hollow circles show the history of the highest and lowest points of the travelling wave, respectively. The current highest and lowest positions for each ψ are highlighted in filled circles.

Movie S5: 3D Animation of the travelling wave generation on a thick film with $\lambda/w = 4$, $\alpha = 10\beta = 40$ and $w/d_{\mathrm{t}} = 40$. The contour plot on the lateral surfaces shows the *trans*-to-*cis* conversion (n_{c}). The undulating top surface illustrates the wave with aggregated deformations.

Movie S6: 2D Animation of the travelling wave generation on a thick film with $\lambda/w = 4$, $\alpha = 10\beta = 40$ and $w/d_{\mathrm{t}} = 40$. The red and blue hollow circles show the history of the highest and lowest points of the travelling wave, respectively. The current highest and lowest positions for each ψ are highlighted in filled circles.