Wavelength tuneable laser emission from stretchable chiral nematic liquid crystal gels via in-situ photopolymerization

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Supplementary Information

Experimental observations of the change in thickness of the liquid crystalline gels upon stretching.

The samples were illuminated using a white light source with a circular polarisation that was of the opposite sense (left circularly polarised) to that of the handedness (right handed) of the chiral nematic liquid crystal. The transmission spectrum was then recorded upon stretching and the interference fringes, an example of which is shown in Figure S1a, for different degrees of film elongation. As the film was stretched, the fringes became closer together, indicating that the film was becoming thinner. A qualitative measurement of the thickness was calculated using a fixed refractive index value of 1.5. The resulting plot of 'thickness' against elongation was found to be a straight line, as would be expected from a simple Poisson's approximation – and corroborating the results seen in Figure 2 where the long wavelength edge of the photonic band-gap was found to vary linearly with increasing elongation.

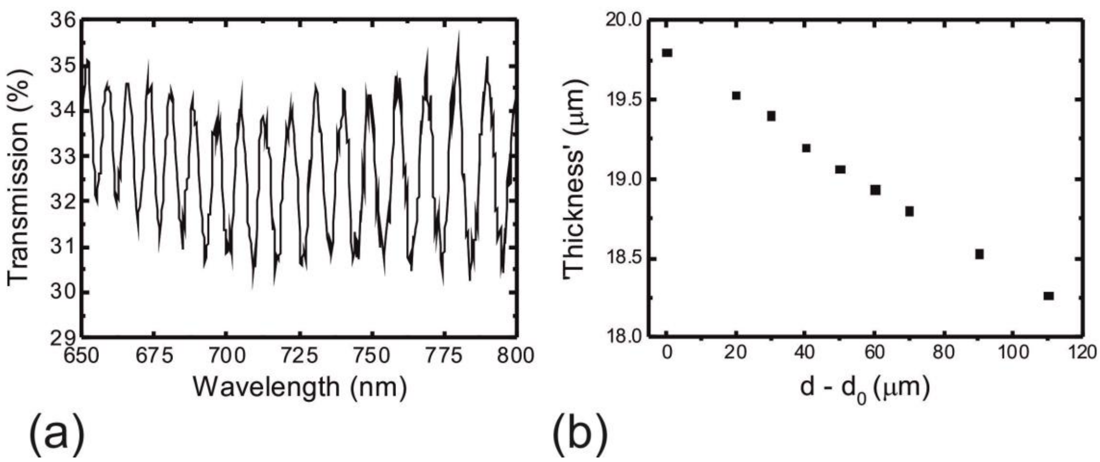

Figure S1 – Thickness measurements. a) An example of the interference fringes for the transmission white light that was left circularly polarised to avoid interfering with the periodic structure of the chiral nematic liquid crystal. b) the change in 'thickness' with elongation of the film.

Video of stretching a liquid crystalline gel when viewed between crossed polarisers of an optical microscope.

The video (attached separately) shows a film being stretched until it snaps (from an initial aperture width of 320 μm to approximately 450 μm aperture width). It is being viewed on an optical polarising microscope so the visible colour red-shifts from green to orange as the film is stretched and the photonic band-gap blue-shifts to shorter wavelengths.