

## Electronic supplementary information (ESI)

**Video 1: Frequency dependence.** E12 NLC with a 2.3  $\mu\text{m}$  silica bead. Laser power is kept constant whereas, laser spot rotation frequency (displayed in the lower right corner) is increased every 5 s. The spot is rotating in the CCW direction. Video was recorded under crossed polarizers with a red wave plate and is displayed in real time.

**Video 2: Laser power dependence.** E12 NLC with 1  $\mu\text{m}$  silica bead. Laser spot rotation frequency is kept constant at 1 kHz in the CW direction on a circle with 5  $\mu\text{m}$  radius. The rotation is presented for three different values of laser power 33 mW, 66 mW and 99 mW, displayed in the lower left corner. Video is displayed in real time.