Supporting Information

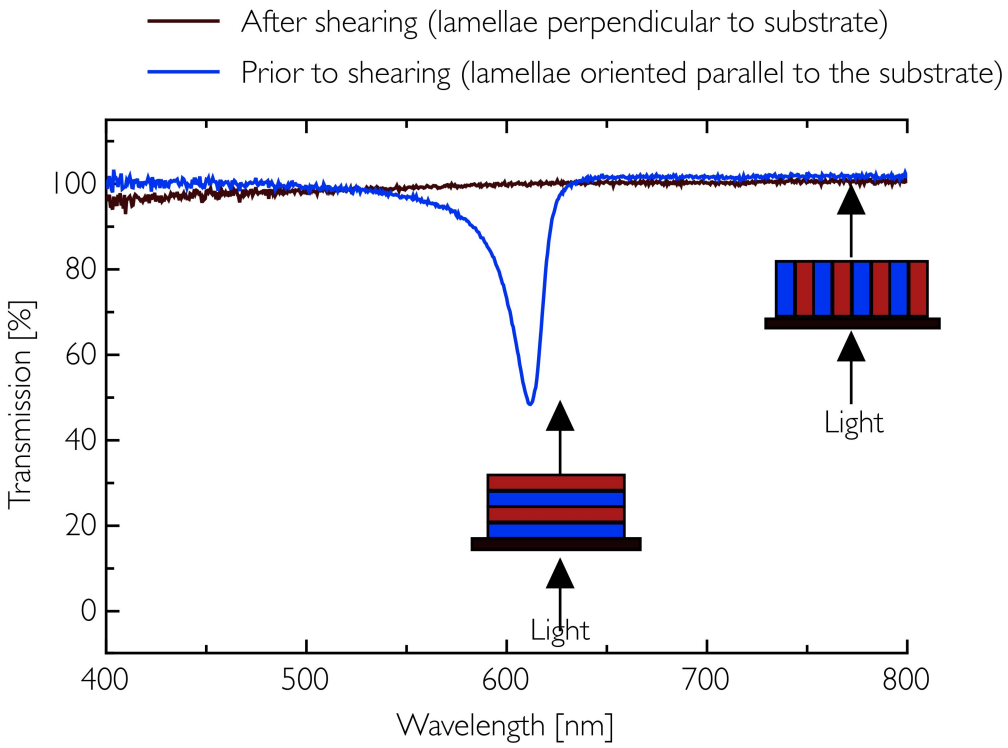

Figure SI 1. The effect of the rotational shear used for the SAXS experiments on the optical properties. It can be seen that when loaded into the shear cell and the spacing is set there exists enough shear to order the material and produce the photonic properties. The rotational shear flow switches the orientation of the lamella period and changes the direction of the layer from parallel to the flow to perpendicular to the flow at high shear rates. The arrows indicate the direction of light through the ordered layers.

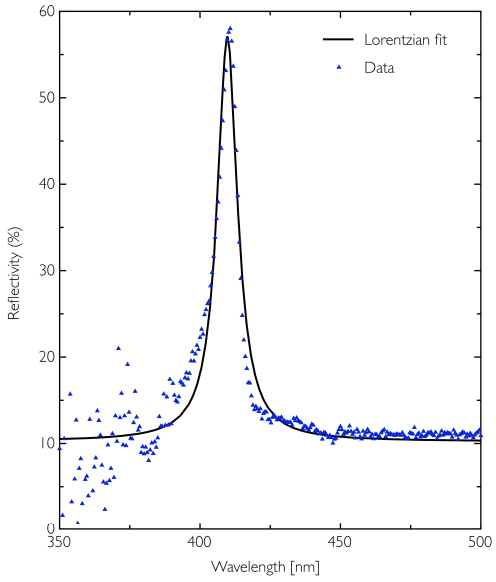

Figure SI 2. Optical transmission data for the pure PS-PI 562K low M_w solution after large amplitude oscillatory shear ordering (the optical peak was fitted to a Lorentzian function).

The optical data was peak fitted to a Lorentzian function and has a full width at half maximum (FWHM) of 8.8 nm

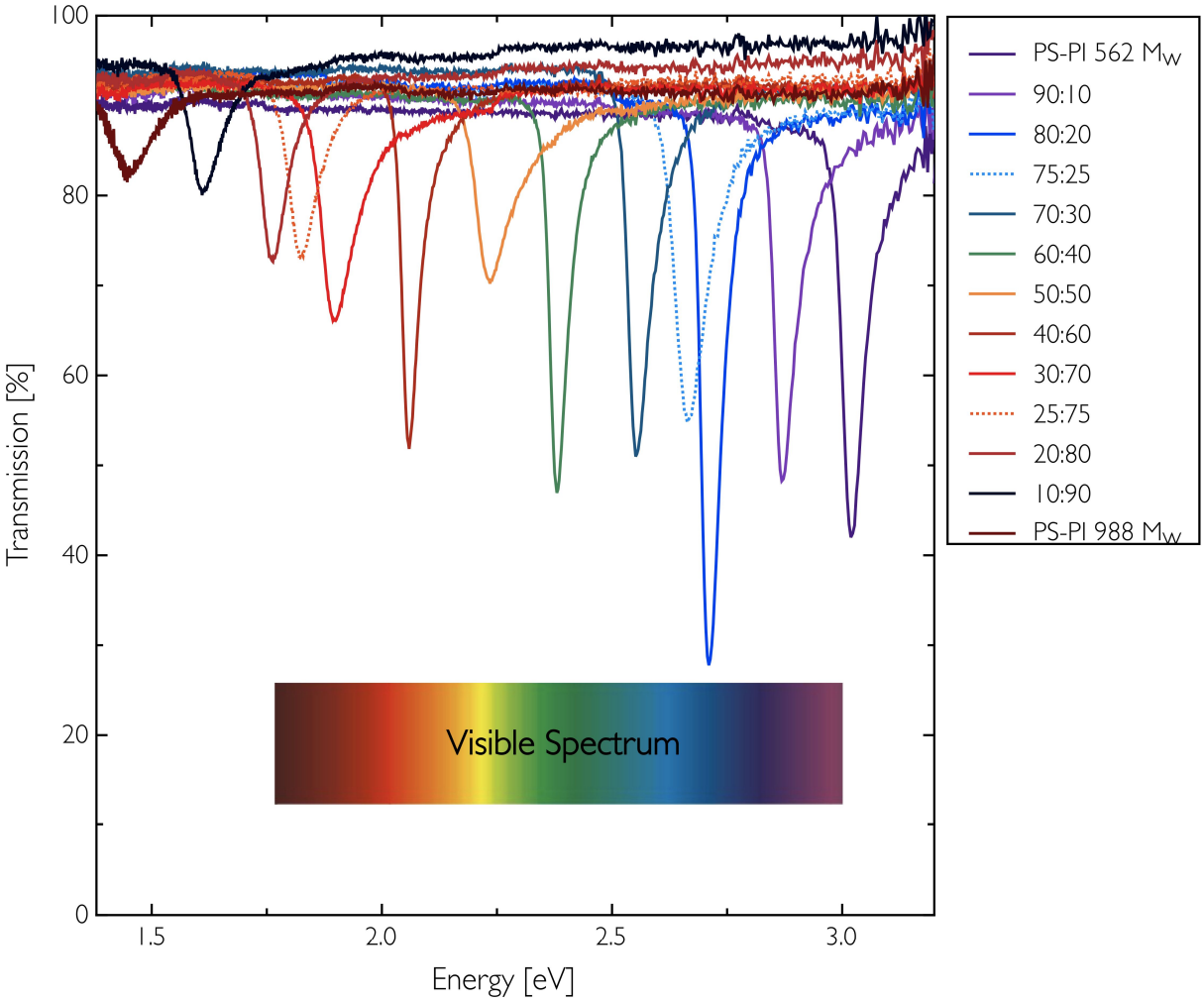

Figure SI 3. Optical properties of the block copolymer blend films showing the change in energy (eV) as a function of blend composition.

χN calculation for the two diblocks

The degree of polymerisation for each block copolymer, *N*, was calculated based on the styrene monomer, $v_s = \frac{M_s}{\rho_{PI}}$ [1].

$$N = \frac{Mw_{PS}/\rho_{PS} + Mw_{PI}/\rho_{PI}}{Ms/\rho_{PS}}$$

Where M_{PS} and M_{PI} are the weight molar masses of the polystyrene and polyisoprene calculated from stoichiometry (using Mw from SEC and the PS weight fraction using NMR), M_s is the molar mass of the styrene monomer, 104g/mol. ρ_{PS}=1.05g/cm^3 and ρ_{PI}=0.92g/cm^3 are the mass densities of polystyrene and polyisoprene [2].

The of polymer volume fraction ϕ was calculated assuming the additivity of volumes and densities for the components of the diblock as well as the solvent, i.e.

$$\phi = \frac{c_{SI} / \rho_{SI}}{c_{SI} / \rho_{SI} + (100 - c_{SI}) / \rho_{solvent}}$$

where c is the block copolymer concentration in weight percent. The value for the density of the solvent used was 0.87 g/cm^3. The value of the interaction parameter between styrene and isoprene, χ used for the calculation was calculated using the formula -0.0228+(33/T) [3, 4] using styrene monomer as a reference volume and for the case at 20ºC was a value of 0.09.

Diblock sample	N	χ	χN	$\phi\chi N$
562K	5747	0.09	523	46
988K	10306	0.09	938	85

1.) Papadakis, C.M., et al., *A small-angle scattering study of the bulk structure of a symmetric diblock copolymer system.* Journal de Physique II, 1997. **7**(12): p. 1829-1854.
2.) Brandrup, J., E.H. Immergut, and E.A. Glurke, *Polymer Handbook*, ed. Wiley. 1999, New York.
3.) Lodge, T.P., et al., *Phase Behavior of Block Copolymers in a Neutral Solvent.* Macromolecules, 2003. **36**(3): p. 816-822.
4.) Huang, C., et al., *Quantifying the "Neutrality" of Good Solvents for Block Copolymers: Poly(styrene-b-isoprene) in Toluene, Benzene, and THF.* Macromolecules, 1998. **31**(26): p. 9384-9386.