Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C
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Supporting Information

Enhanced Interfacial Rigidity of 1D Thermoset Nanostructures by Interface-Induced Liquid Crystallinity

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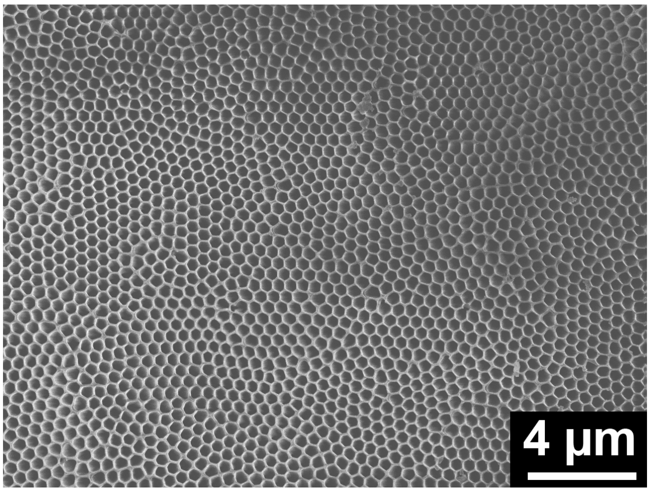

Figure S1. Scanning electron microscopy image of self-ordered AAO prepared according the method reported in H. Masuda, K. Yada, and A. Osaka, *Jpn. J. Appl. Phys.,* 1998, **37**, L1340.

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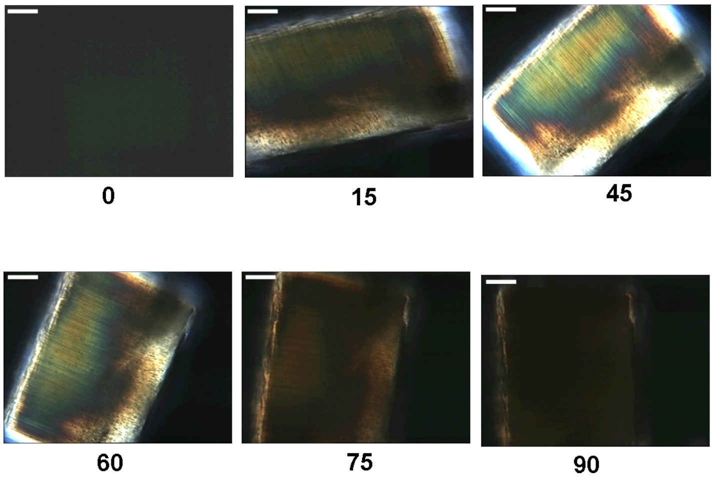
(A)



(B)

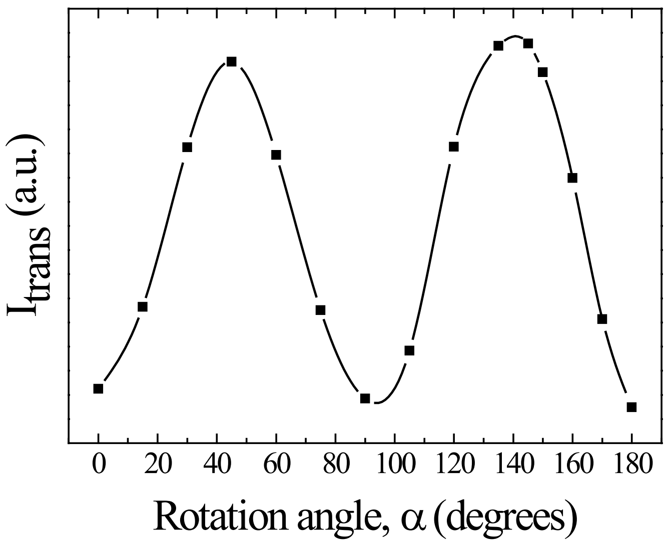


Figure S2. (A) POM of aligned PCRs (diameter 380 nm) lying flat on a glass slide for different rotation angles α. The scale bars correspond to 20 μm. (B) Integrated transmitted light intensity of the PCRs as a function of the rotation angle α.

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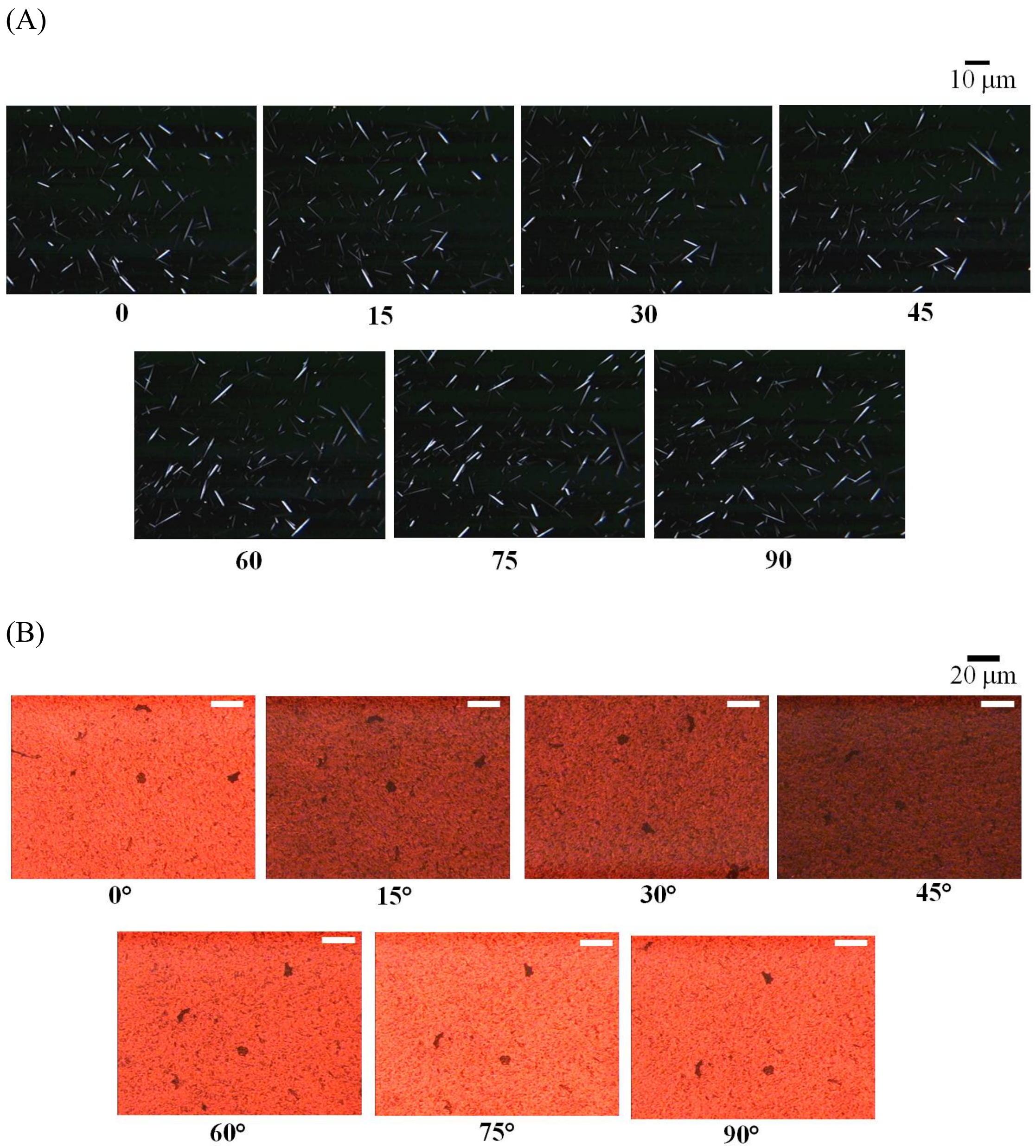

Figure S3. POM images of (A) bulk CEM monomer and (B) a bulk PCN film with a thickness of 150 μm located between crossed polarizers.

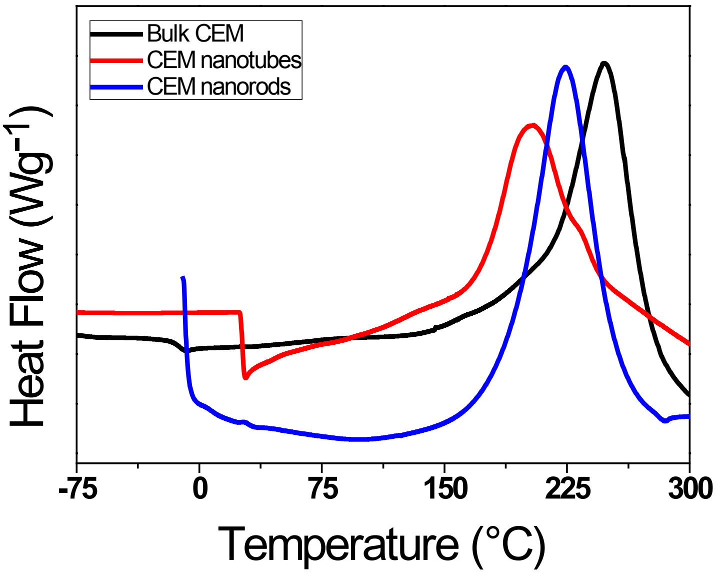

Figure S4. DSC scans of bulk CEM (black solid line), CEM nanotubes obtained by CEM infiltration into AAO at 80°C (blue solid line) and CEM nanorods obtained by CEM infiltration into AAO at 120°C (red solid line). During the DSC scans, the CEM nanotubes and nanorods were located in AAO with a pore diameter of 380 nm and a pore depth of 100 μm.

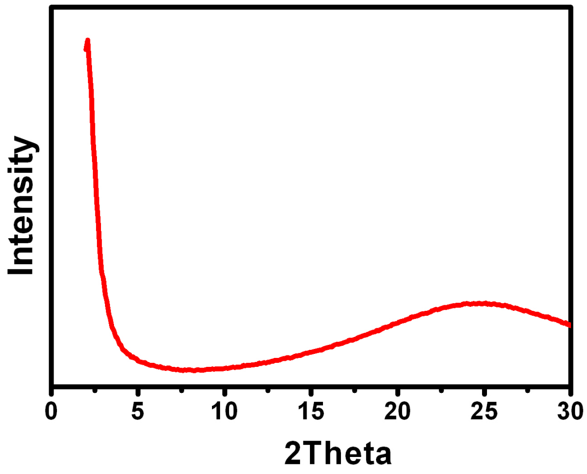

Figure S5. θ/2θ scan of a bulk PCN film prepared as described in "Experimental Details". The WAXS measurement was performed at room temperature. The surface of the PCN film was oriented perpendicularly to the plane of the incident and scattered X-ray beams.

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METHODS

Calculation of Birefringence from Transmitted Light Intensity: The birefringence of PCRs, Δn, is

$$\Delta n = n_{\parallel} - n_{\perp} \tag{1}$$

where $n_{\parallel}$ and $n_{\perp}$ are the refractive indices for light polarized parallel and perpendicular to the PCR long axes. Then, the retardation R is defined as

$$R = \frac{\mathrm{d}}{\lambda}\Delta n \tag{2}$$

where d is the thickness of the probed PCR bundle and λ the wavelength of the incident light. The electric field strength of the incident light is

$$E_{\parallel} = \frac{1}{\sqrt{2}} E_0 \cos(\omega t) \quad \text{and} \quad E_{\perp} = \frac{1}{\sqrt{2}} E_0 \sin(\omega t) \tag{3}$$

where $E_{\parallel}$ and $E_{\perp}$ are the parallel and perpendicular components of the incident electric field E_0. So, after passing through the sample, it is retarded in a phase (Γ)

$$E_{\parallel}' = \frac{1}{\sqrt{2}} E_0 \cos(\omega t - \Gamma_{\parallel}) \text{ and } E_{\perp}' = \frac{1}{\sqrt{2}} E_0 \sin(\omega t - \Gamma_{\perp}) \tag{4}$$

They are then resolved into two components $E_{\parallel}''$ and $E_{\perp}''$along the analyzer which is 90° to the polarizer,

$$E_{\parallel}'' = \frac{1}{2} E_0 \cos(\omega t - \Gamma_{\parallel}) \text{ and } E_{\perp}'' = \frac{1}{2} E_0 \sin(\omega t - \Gamma_{\perp}) \tag{5}$$

The net electric field strength $\Delta E''$ can then be calculated as:

$$\Delta E'' = E_{\parallel}'' - E_{\perp}'' \tag{6}$$

The light intensity I transmitting the the probed sample can be calculated as:

$$I = k\,\overline{(\Delta E'')^2} = \frac{kE_0^2}{4}\left[1 - \cos\left(\Gamma_{\parallel} - \Gamma_{\perp}\right)\right] \tag{7}$$

and the incident light intensity I_0 as:

$$I_0 = k\,\overline{(\Delta E)^2} = \frac{kE_0^2}{2} \tag{8}$$

Since $\Gamma_{\parallel} - \Gamma_{\perp} = 2\pi R$, one obtains for the transmission T:

$$T = \frac{I}{I_0} = \sin^2(\pi R) \tag{9}$$