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Chromaticity of structural color in polymer thin film photonic crystals: supplement

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Fig. S1. a) Simulated reflectance spectra of opal films, based on a corresponding non-absorbing $\lambda/4$ multilayer quasi-model [1], with parameters 100 layer-pairs, distributed layer-disorder of 4% (Gaussian), index contrast $\Delta n \approx 0.025$ (as inferred from Zhao et al. [2]), and peak wavelength at normal incidence set to 560 nm. The reflectivity spectra of this model structure is calculated as a function of incidence angle, using a transfer-matrix method averaged over many iterations, shown in b) is a corresponding light-field intensity vs. depth plot for the normal incident ($\theta = 0^\circ$) case, with an exponential decay trendline ($\lambda_{Bragg} \approx 10 \mu m$) added for clarity.
Fig. S2. Rescaled data from figures 3b)-d), showing the reflectivity response of polymer opal films as a function of viewing angle $\theta_m$ for $\phi_m = 90^\circ$, $\theta_l = 15^\circ$ parallel to the BIOS direction $\hat{g}$; data is shown for a) pre-BIOS, b) 5 BIOS and c) 40 BIOS samples. All scattering cone plots are set to the same intensity scale as the pre-BIOS sample in order to accentuate detail at the short-$\lambda$ regime.
Table S1. The average saturation (%) of structural color (±0.5%) for polymer opals of 0 - 40 cycles of BIOS ordering, where $\theta_I = 15^\circ$ both parallel and perpendicular to the shear direction. Underlining of maximum saturation values for each value of $\varphi_m$ indicates how this maximum is reached at 10 BIOS cycles in all planes aside from that perpendicular to incidence.

| $\varphi_m$ (°) | Plane of incidence ǁ to BIOS | Plane of incidence  to BIOS |
|----------------|-----------------------------|-----------------------------|
|                | 0   | 5   | 10  | 20  | 40  | 0   | 5   | 10  | 20  | 40  |
| 90             | 4   | 40  | 51  | 47  | 43  | 3   | 40  | 52  | 49  | 48  |
| 60             | -   | 32  | 47  | 41  | 38  | -   | 32  | 44  | 39  | 37  |
| 30             | -   | 34  | 41  | 37  | 35  | -   | 34  | 44  | 42  | 36  |
| 0              | 3   | 13  | 25  | 23  | 20  | 4   | 40  | 11  | 50  | 44  |

Table S2. The dominant wavelengths (nm) for structural color for polymer opals of 0 - 40 cycles of BIOS ordering, where $\theta_I = 15^\circ$ both parallel and perpendicular to the shear direction. Underlining of longest dominant wavelength for each $\varphi_m$ indicates the general result shifted to longer wavelength as opal ordering increases with the BIOS process.

| $\varphi_m$ (°) | Plane of incidence ǁ to BIOS | Plane of incidence  to BIOS |
|----------------|-----------------------------|-----------------------------|
|                | 0   | 5   | 10  | 20  | 40  | 494 | 582 | 582 | 584 | 584 |
| 90             | 494 | 580 | 581 | 584 | 586 | 584 | 584 | 584 | 584 | 584 |
| 60             | -   | 581 | 580 | 577 | 580 | -   | 584 | 583 | 584 | 595 |
| 30             | -   | 580 | 584 | 587 | 592 | -   | 584 | 585 | 585 | 597 |
| 0              | 494 | 581 | 587 | 585 | 594 | 492 | 582 | 609 | 586 | 596 |

Table S3. The calculated Voigt profile full-width half maxima (°) for the intensity profiles of polymer opals of 0 - 40 BIOS cycles, where $\theta_I = 15^\circ$ both parallel and perpendicular to the shear direction. Greatest values for each $\varphi_m$ are shown in bold, and increased BIOS ordering is demonstrated to result in a broadened scattering cone, with structural color visible over a larger solid angle.

| $\varphi_m$ (°) | Plane of incidence ǁ to BIOS | Plane of incidence  to BIOS |
|----------------|-----------------------------|-----------------------------|
|                | 0   | 5   | 10  | 20  | 40  | 0   | 5   | 10  | 20  | 40  |
| 90             | 17.1| 19.1| 19.9| 24.6| -   | 40.5| 43.0| 39.3| 43.3| 43.3 |
|                | ±2.3| ±2.3| ±2.4| ±3.6| ±29.2| ±24.4| ±17.6| ±21.8|
| 60             | 22.6| 23.2| 23.0| 28.3| -   | 36.4| 32.1| 29.7| 35.7| 35.7 |
|                | ±4.4| ±3.8| ±4.6| ±5.5| ±11.2| ±9.0| ±7.7| ±11.9|
| 30             | 31.2| 29.2| 26.2| 34.7| -   | 21.6| 20.2| 19.6| 24.9| 24.9 |
|                | ±7.6| ±6.1| ±6.6| ±12.3| ±4.1| ±3.1| ±4.1| ±5.2|
| 0              | 27.1| 28.6| 22.2| 33.6| -   | 14.2| 16.2| 19.6| 24.9| 24.9 |
|                | ±27.1| ±19.0| ±12.9| ±14.1| ±2.0| ±1.7| ±4.1| ±5.2|
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