Supporting Information

Different Structural Colors or Patterns on the Front and Back Sides of a Multilayer Photonic Structure

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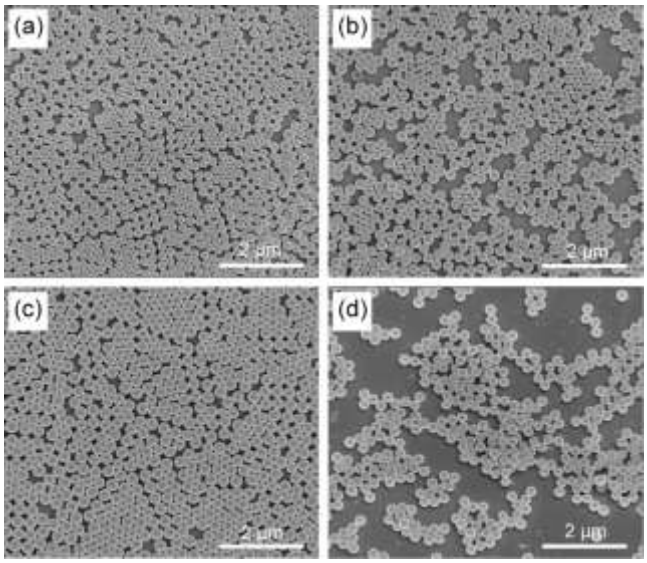

Figure S1. The SEM images of SiO_2 microspheres with diameter of (a) 220 nm, (b) 250 nm, (c) 290 nm, and (d) 230 nm.

According to Bragg's law and Snell's law, the photonic stop bands of FCC structured PCs can be theoretically calculated as

$$\lambda = 2\sqrt{2/3}(D)\left(\sqrt{n^2 - \sin^2\theta}\right) \quad (1)$$

$$n^2 = 0.74 \times {n_0}^2 + 0.26 \times {n_c}^2 \quad (2)$$

Where λ is the wavelength of reflection peak; θ *i*s the incident angle, equal to the detection angle; D is the diameter of the latex particles; n is the effective refractive index; n_0= 1.45 and n_c = 1.0 are the refractive index of silica and the air, respectively.

We can prepare silica spheres with needed diameters needed through the Bragg's law of diffraction. So we can convert the formula into another form like

$$D = \lambda / \left[1.63 \times \sqrt{(1.82 - \sin^2\theta)}\right] \quad (3)$$

First, let's assume that the incident angle (θ) is 5, and then use the position of the band gap (λ) to determine the diameter (D) of the silica particle we needed according to Equation (3). The results are shown in the table S1.

Table S1. Diameter of the silica microsphere we used

λ (nm)	θ (°)	Theoretical D (nm)	Practical D (nm)
625	5	285	~290
533	5	243	~250
470	5	214	~220

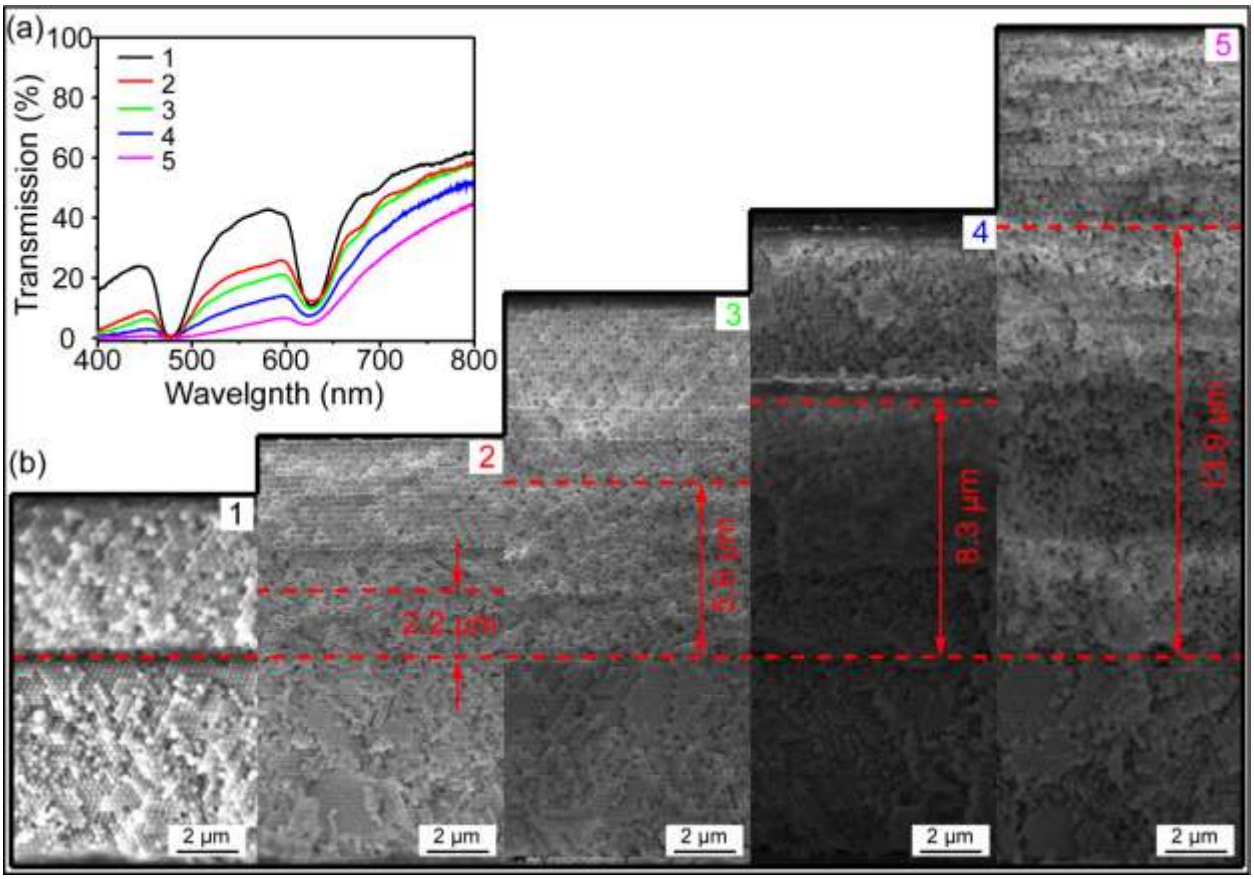

Figure S2. (a) Transmittance spectra and (b) Typical cross-sectional SEM images of different thickness of amorphous structure of trilayer photonic structures.

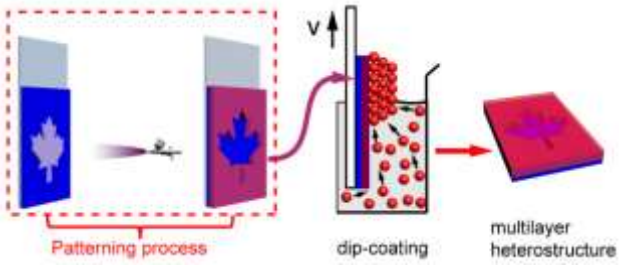

Figure S3. Schematic diagram of the fabrication of a trilayer photonic structure in which the amorphous structure is patterned with a mask.

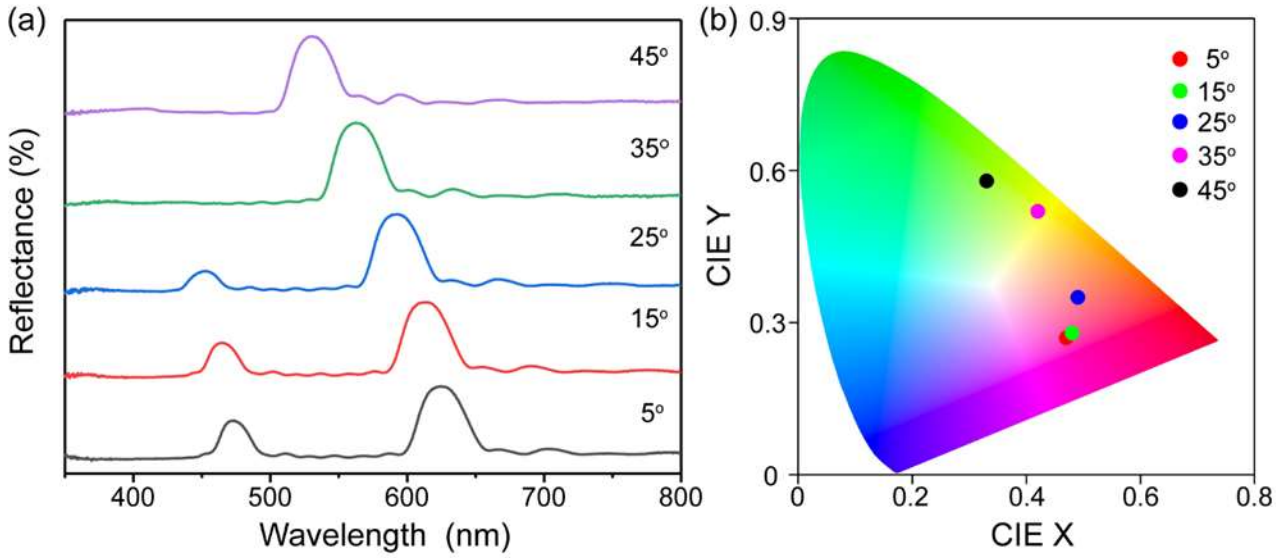

Figure S4. (a) Reflection spectra of patterned part with different angles of the front side of the trilayer structure, (b) CIE coordinates map corresponding to (a).

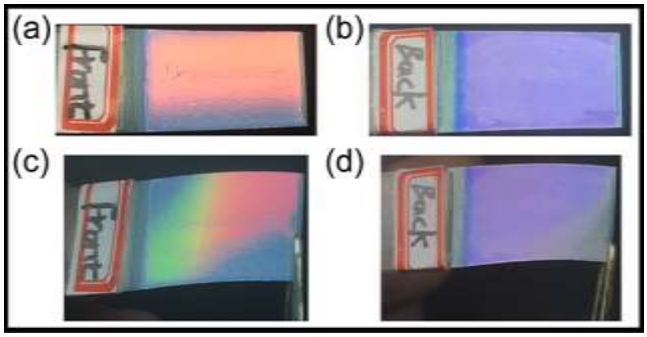

Figure S5. Digital photos of multilayer photonic structure when flexible polyethylene terephthalate is used as substrate. (a, c) front side; (b, d) back side.