

## *Supporting Information*

### **Covalently Anchored Photonic Crystal Skins for Robust Structural Colors on Textiles**

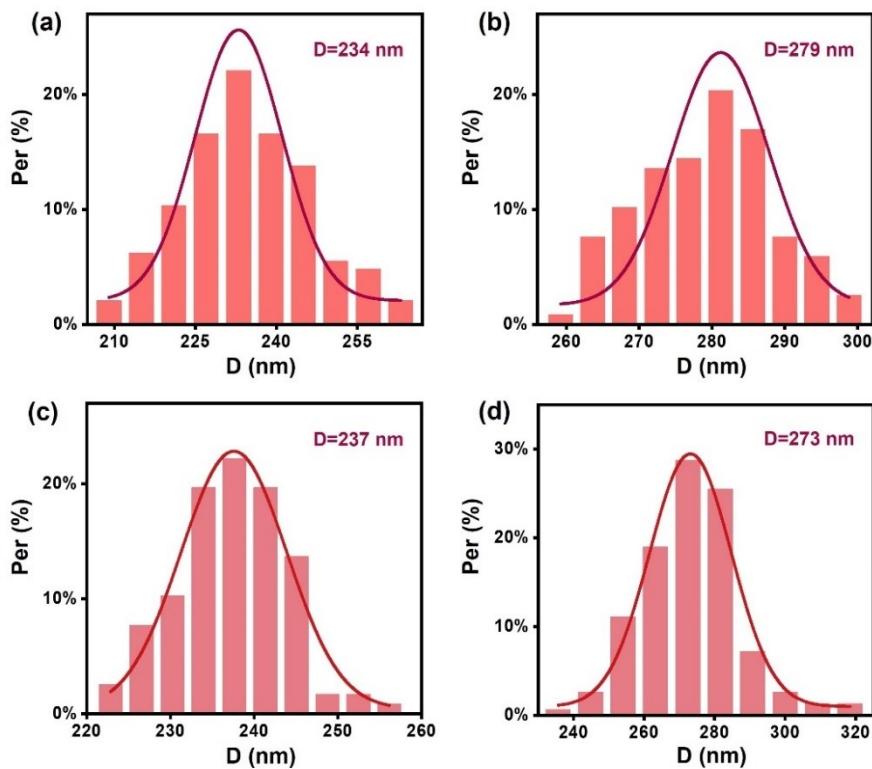
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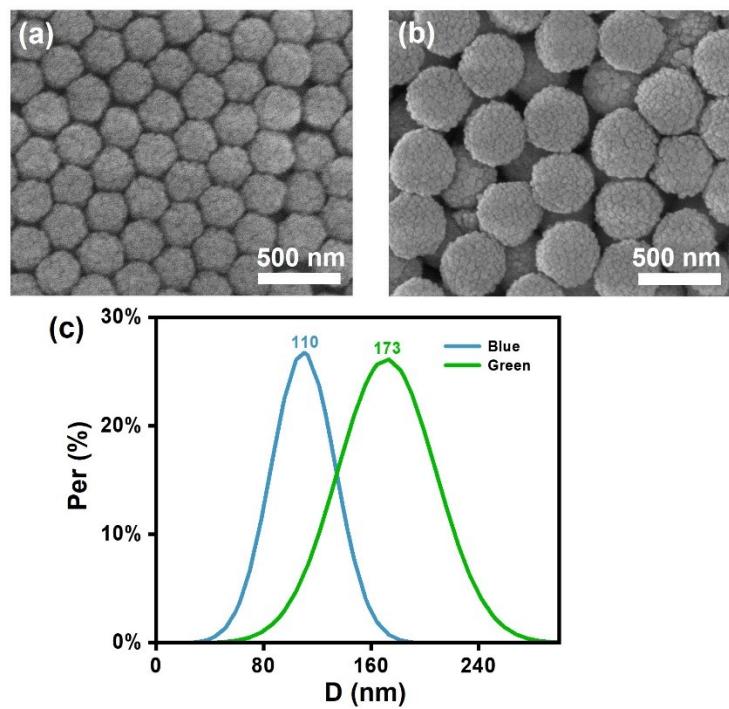
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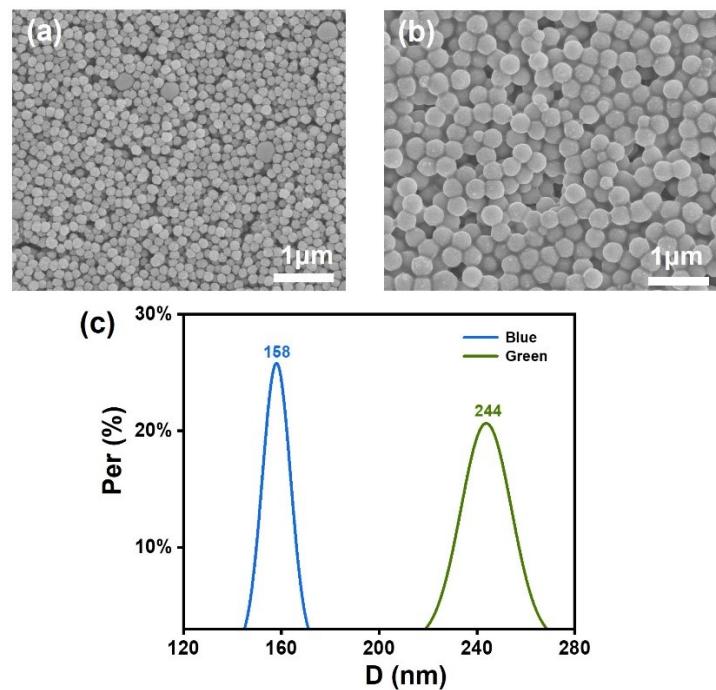


**Figure S1.** The change in particle size of red colored ZnS was measured before and after coating. (a) Size distribution of red colored ZnS core nanoparticles was measured by SEM. (b) Size distribution of red colored ZnS@PDA nanoparticles was measured by SEM. (c) Size distribution of red colored ZnS core nanoparticles was measured by TEM. (d) Size distribution of red colored ZnS@PDA nanoparticles was measured by TEM.

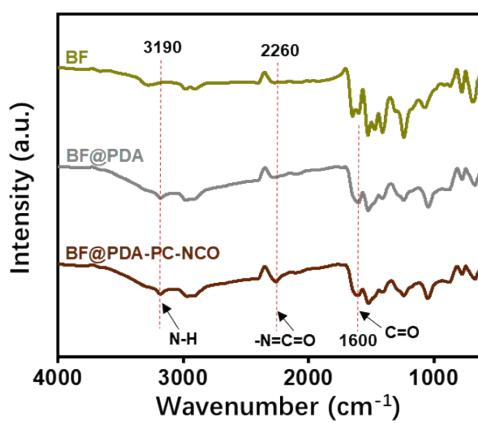


**Figure S2.** SEM images and size statistics (before coating). (a) SEM image of blue

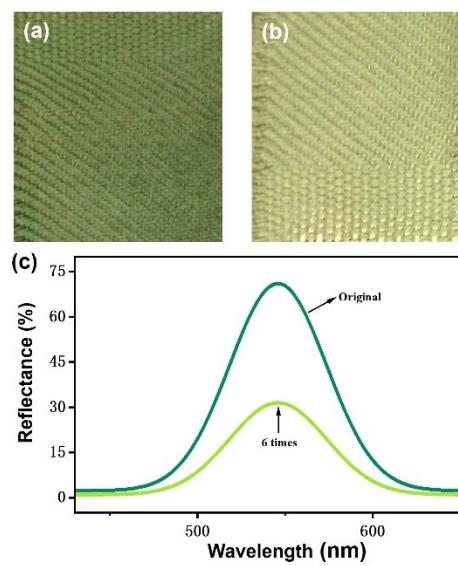
colored ZnS core. (b) SEM image of green colored ZnS core. (c) Size statistics of blue and green colored ZnS core.



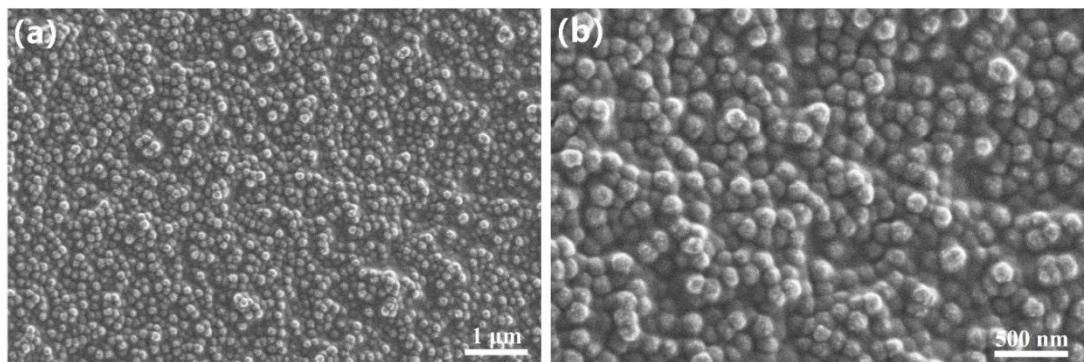
**Figure S3.** Size statistics of nanoparticles (after coating). (a) SEM image of blue colored ZnS@PDA nanoparticles. (b) SEM image of green colored ZnS@PDA nanoparticles. (c) Size statistics of blue and green colored ZnS@PDA nanoparticles.



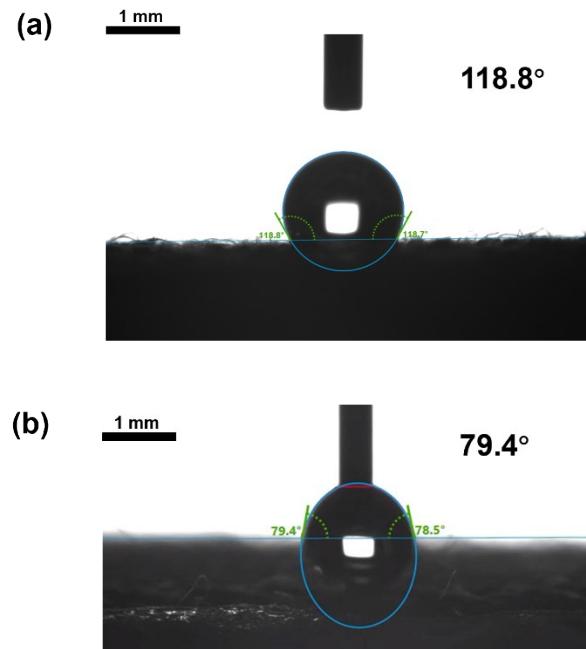
**Figure S4.** Comparative FTIR spectra of BF fabrics before and after modification.



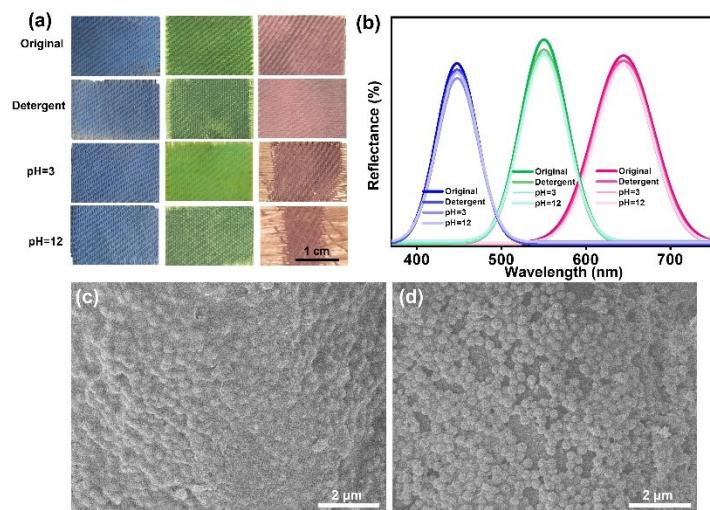
**Figure S5.** Washing resistance of green structural color BF@PDA-PC fabric. (a) Digital photograph of green structural color ZnS@PDA BF-fabric. (b) Digital photograph of green structural color BF@PDA-PC fabric washed for 6 times. (c) The spectra of green structural color ZnS@PDA BF-fabric after washing for 6 times.



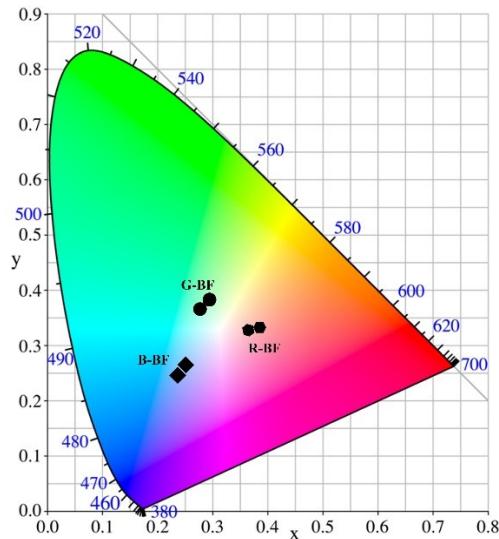
**Figure S6.** The arrangement of ZnS@PDA nanoparticles on BF fabric. (a) The arrangement morphology of ZnS@PDA nanoparticles at small magnification. (b) The arrangement morphology of ZnS@PDA nanoparticles at high magnification.



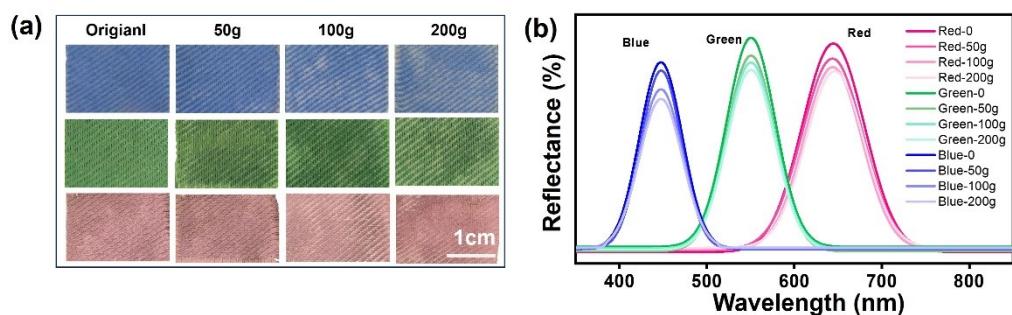
**Figure S7.** Hydrophilic modification of BF fabric surface. (a) The contact angle of BF fabric before PDA modification. (b) Contact angle of BF fabric modified by PDA.



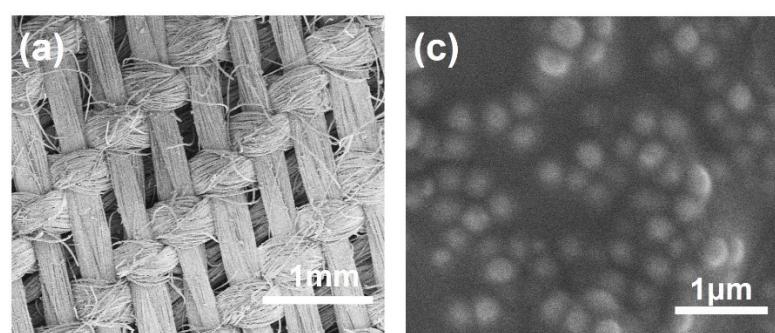
**Figure S8.** Washing resistance of PC-coatings BF fabric after IPDI modification. (a) Digital photographs of BF fabrics washed 0 and 24 times in aqueous solution containing detergent, pH=3 and pH=12. (b) Reflection spectra of BF fabrics washed for 0 and 24 times in aqueous solution containing detergent, pH=3 and pH=12. (c) SEM image of green PC coated BF fabric washed 0 times in aqueous solution. (d) SEM image of green PC coated BF fabric washed 24 times in aqueous solution.



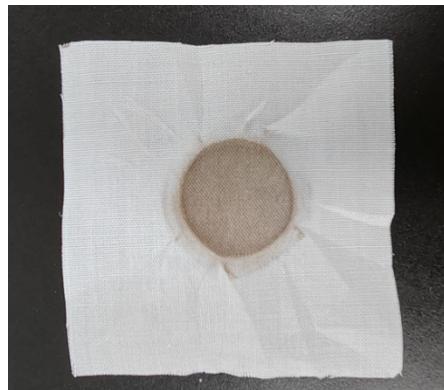
**Figure S9.** The CIE diagram of BF fabrics with different structural colors before and after washing in different solvents.



**Figure S10.** Rub resistance of PC coated BF fabric modified by IPDI. (a) Digital photographs of PC-coatings BF fabric subjected to 10 cycles of friction under different weights. (b) The reflection spectra of PC-coatings BF fabric subjected to 10 cycles of friction under different weights.



**Figure S11.** Rub resistance of PC-coatings modified by IPDI under microscope. (a) SEM image of PC-coating after rubbing with 200 g weight for 10 cycles. (b) The enlarged SEM image of PC coating after rubbing with 200 g weight for 10 cycles.



**Figure S12.** Testing the staining of white standard friction cloth with a color fastness friction tester.

**(1) The explanation of parameters  $L^*$ ,  $a^*$ ,  $b^*$ ,  $c_{ab}^*$  and  $h_{ab}^{\circ}$  in Table 1:**

- ①  $L^*$  (Lightness), indicating the lightness and darkness of the color.
- ②  $a^*$  (red-green axis) indicates the position of the color between red and green.
- ③  $b^*$  (yellow-blue axis) indicates the position of the color between yellow and blue.
- ④  $c_{ab}^*$  (Chroma), indicating the saturation or vividness of a color.
- ⑤  $h_{ab}^{\circ}$  (Hue Angle) represents the hue of the color.