

Supporting information:

**Fabrication and Characterization of Structurally Colored Pigments
based on Carbon Modified ZnS Nanospheres**

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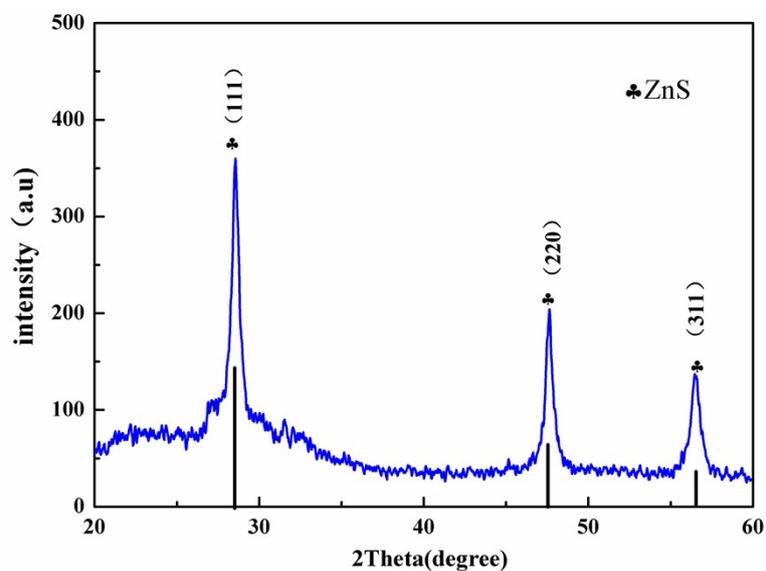


Fig. S1.XRD patterns of ZnS microspheres after calcinations

the XRD patterns of the as-synthesized samples(As shown in Fig. S1) (calcinated in Ar gas protecting at 500 °C for 2 h) confirmed that pure ZnS could be obtained under the current synthetic route.The X-ray diffraction peaks at the 2θ values of 28.6corresponding to the (111) crystal planes, 47.7 corresponding to the (2 2 0) crystal planes and 56.6 corresponding to the (311) crystal planes which matched well with the reported JCPDS data (Card NO.65-0309).

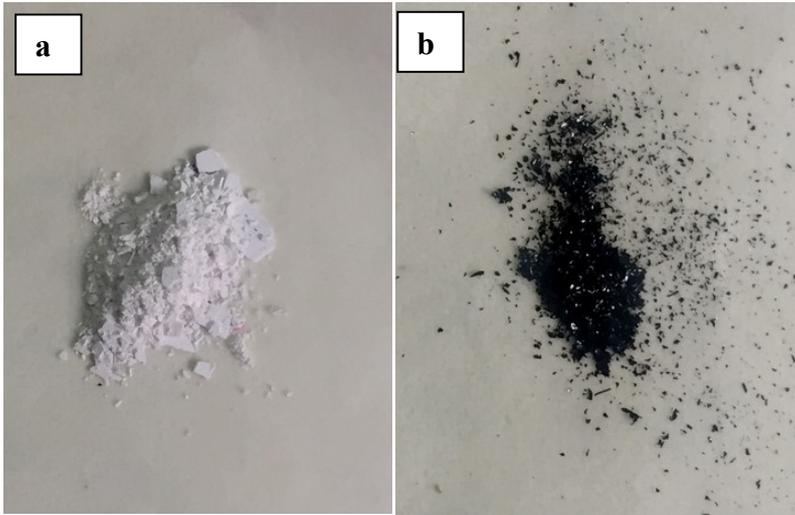


Fig. S2.a. as-prepared fresh ZnS powders also have a white appearance; b. pure PVP calcination at 500 °C for 2 h under argon protection show a black appearance.

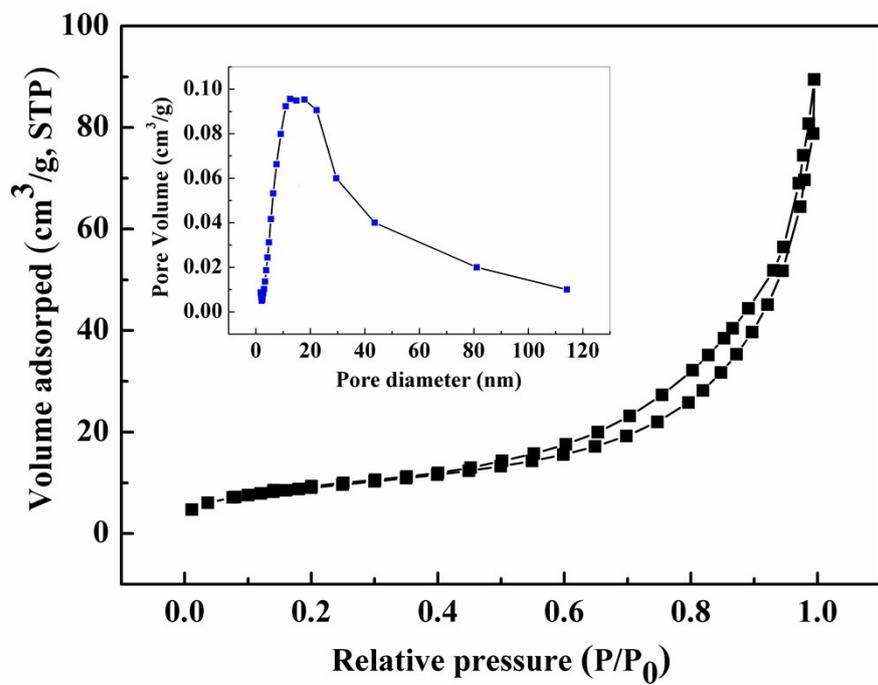


Fig. S3 Nitrogen adsorption/desorption isotherm and Barrett - Joyner - Halenda (BJH) pore size distribution plot (inset) of the as-prepared ZnS spheres

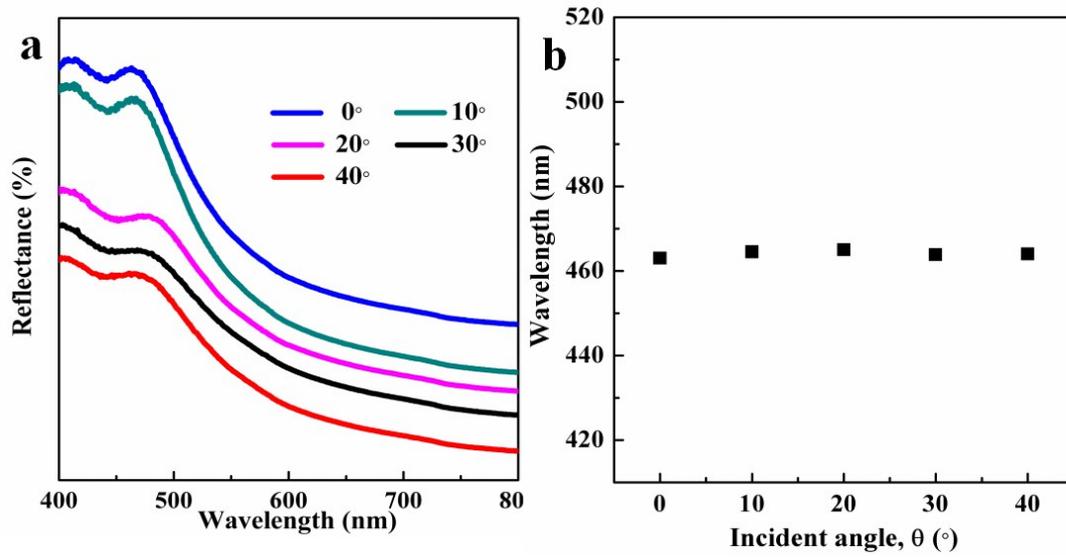


Fig. S4 Reflection spectra of the blue coatings at different incident angles, θ , from 0° to 40°. (d-e)

Relationships between the peak position of reflection spectra and incident angle.

Table S1. calculated and measured wavelength positions of the (111) stop bands of the photonic crystal structure color films and the size parameter (π^*r/λ)

colloid	size	λ_{calcd}	λ_{exp}	$\pi^*r/\lambda_{\text{calcd}}$	$\pi^*r/\lambda_{\text{exp}}$
	230	782	465	0.46	0.78
ZnS	280	952	535	0.46	0.82
	325	1105	630	0.46	0.81