Supporting information

Asymmetric Structural Colors Based on Monodisperse Single Crystal Cu$_2$O spheres

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**Fig. S1** The transmission (a) and the absorption (b) spectrum of the film built from 200 nm single crystal Cu$_2$O spheres; the distributions of magnetic field distribution of a single crystal Cu$_2$O sphere on a transparent glass slide calculated by a FDTD method from front incidence at 528 nm c) and back incidence at 498 nm d).
**Fig. S2** SEM images and cross section of Cu$_2$O spheres with different size. (a-b) 240 nm; (c-d) 270 nm.

**Fig. S3** The reflectance spectra and photographs of back side of different coverage density of the films with 240 nm single crystalline Cu$_2$O spheres.

**Fig. S4** The cross section SEM of TiO$_2$ layer.