Manipulating the emission intensity and lifetime of NaYF₄:Yb³⁺,Er³⁺ simultaneously by embedding them into CdS photonic crystals

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Figure S1 SEM images of monodisperse CdS spheres with different diameters: (a)180 nm; (b)200 nm; (c)220 nm; (d)230 nm; (e)245 nm; (f)XRD patterns of CdS spheres of sample a~e.
Figure S2 XRD pattern of the obtained UCNPs before surface modification.

Figure S3 SEM images of pure CdS PCs prepared from spheres with different diameters: (a) 180 nm; (b) 200 nm; (c) 220 nm; (d) 245 nm.

Figure S4 The SEM image of the disordered CdS/NaYF₄:Yb³⁺,Er³⁺ composite film.
Figure S5 Absorption spectra of the CdS/UCNPs composite PC films obtained from 180 nm, 200 nm, 220 nm and 245 nm CdS spheres.

Figure S6 Luminescence decay curves of Er$^{3+}$ ions (red emission) in the UCNPs, CdS/UCNPs composite PC film (C-4) and CdS/UCNPs composite film (C-5).
Figure S7 SEM images of (a–c) pure PS PCs and (d–f) PS/NaYF$_4$:Yb$^{3+}$,Er$^{3+}$ composite PCs with PS spheres in different diameters as build blocks. (a,d) 245 nm; (b,e) 270 nm; (c,f) 297 nm.