New Coding-Decoding System through Combing Near-Infrared Photonic

Crystals and Their Linear Dynamic Reflection Spectra

Cheng Ouyang,‡[a] Yuqi Zhang, ‡[b] Dongpeng Yang,*[a] Dekun Ma [c] and Shaoming Huang*[a]

[a] School of Materials and Energy, Guangzhou Key Laboratory of Low-Dimensional Materials and Energy Storage Devices, Guangdong University of Technology, Guangzhou 510006, P. R. China
[b] Institute of Textiles and Clothing, The Hong Kong Polytechnic University, Hong Kong SAR, P. R. China
[c] Zhejiang Key Laboratory of Alternative Technologies for Fine Chemicals Process, Shaoxing University, Shaoxing 312000, P. R. China

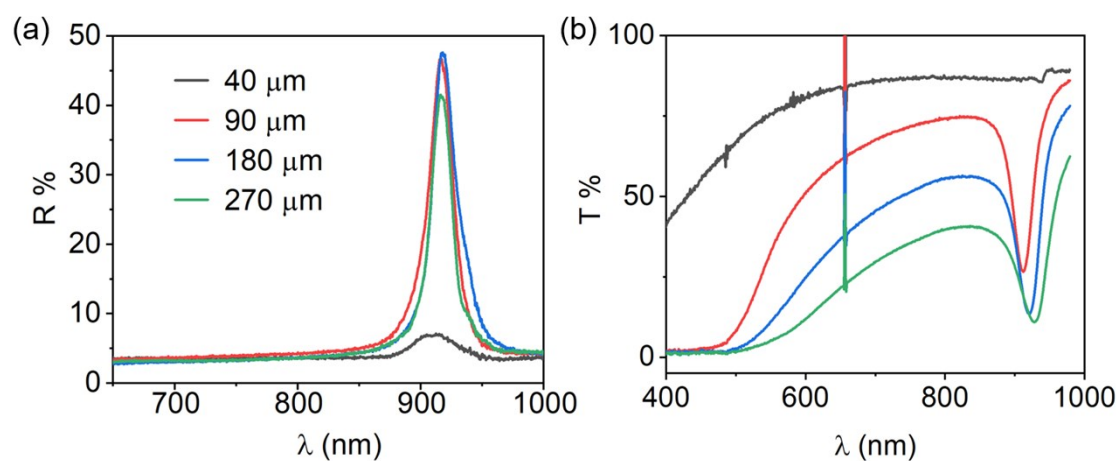Email: dpyang@gdut.edu.cn; smhuang@gdut.edu.cn

Figure S1. (a) Reflection and corresponding (b) transmission spectra of NIRPC film with different thickness.
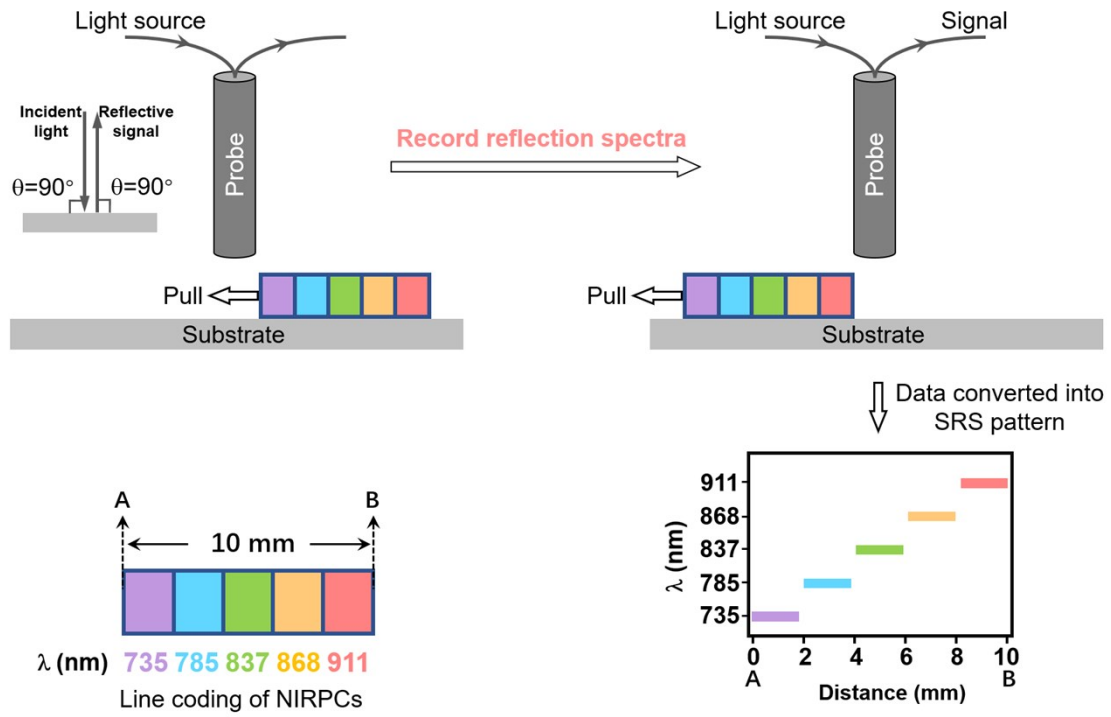
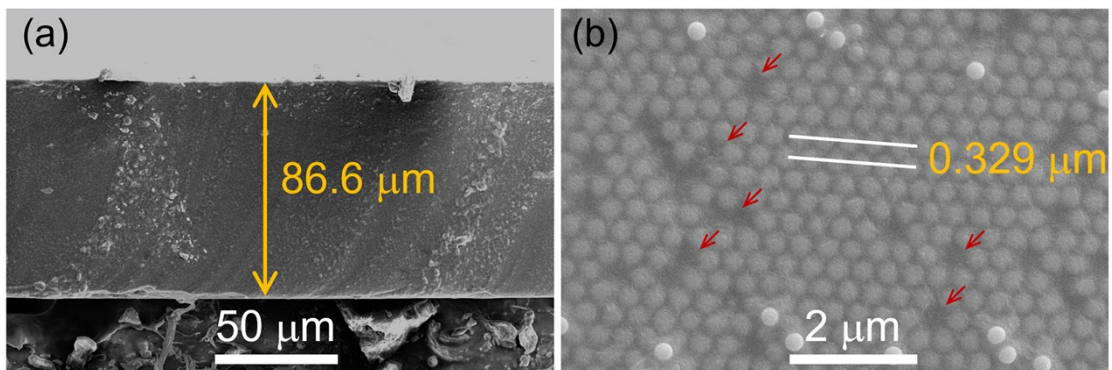Figure S2. A schematic illustration of the decoding process by SRS.

Figure S3. (a) low and (b) high magnification of cross-sectional SEM images of NIRPC film with reflection peak position located at 911 nm.
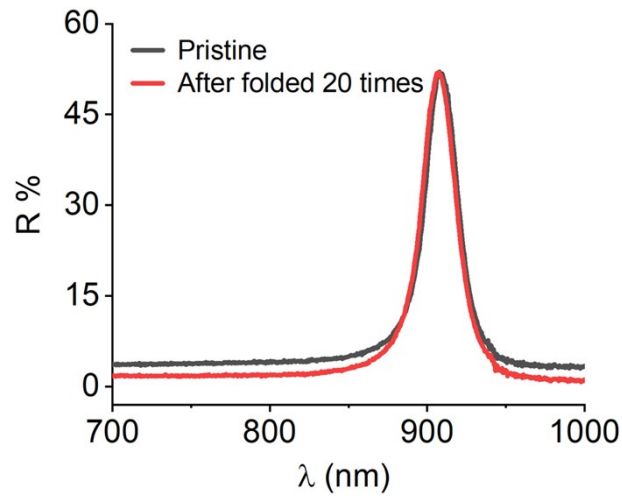
Figure S4. Reflection spectra of NIRPC film at pristine state and after being folded with 20 times.

$$m\lambda = 1.633nD\sin\theta$$
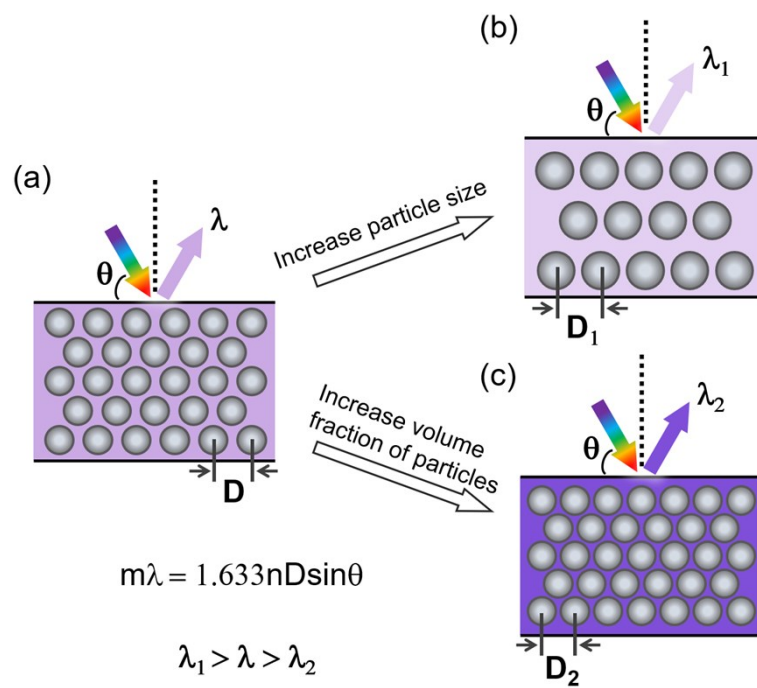
$$\lambda_1 > \lambda > \lambda_2$$

Figure S5. Schematic illustration of diffraction of light by NIRPC and the effect of particle size and volume fraction of particles on the reflection wavelength of NIRPC.
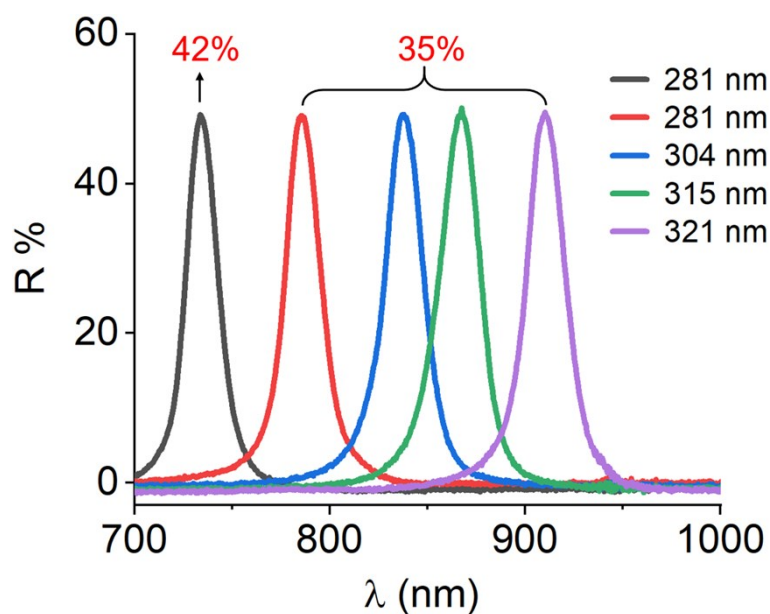
Figure S6. Reflection spectra of the NIRPCs fabricated using silica particles with different size.

The volume fraction of silica in these NIRPC was fixed to 42% or 35%, which are marked in red

color.

Table S1. Interparticle distance (D) and Reflection wavelength (λ) of NIRPC calculated from SEM images and reflection spectra. $\theta = 90°$.

f_{SiO2}	D (nm) calculated from SEM	λ (nm) calculated from SEM	D (nm) calculated from reflection spectra	λ (nm) from reflection spectra
0.42	299.7	727	303.1	735
0.35	314.5	764	323.5	785
0.35	335.3	814	344.6	837
0.35	362.0	879	357.2	868
0.35	379.9	923	375.1	911

Table S2. Angle-resolved reflection wavelength (λ) of NIRPC calculated from SEM images and obtained from reflection spectra.

θ	λ_{NIRPC} (nm)						
	90°	80°	70°	60°	50°	40°	30°
Calculated results	727	722	707	684	655	622	590
Spectra data	735	728	712	688	657	626	594
Calculated results	764	759	743	719	689	654	620
Spectra data	785	774	758	732	700	664	630
Calculated results	814	808	792	766	734	697	661
Spectra data	837	829	810	783	748	711	674
Calculated results	879	873	855	827	792	753	714
Spectra data	868	863	843	814	779	739	702
Calculated results	923	916	898	867	832	790	750
Spectra data	911	904	885	854	817	778	738