

Supplementary Information for:

High-Efficiency and Broadband Near-Infrared Bi-Functional Metasurface Based on Rotary Different-Size Silicon Nanobricks

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Supplementary Note 1: Broadband characteristics of bi-functional beam deflector

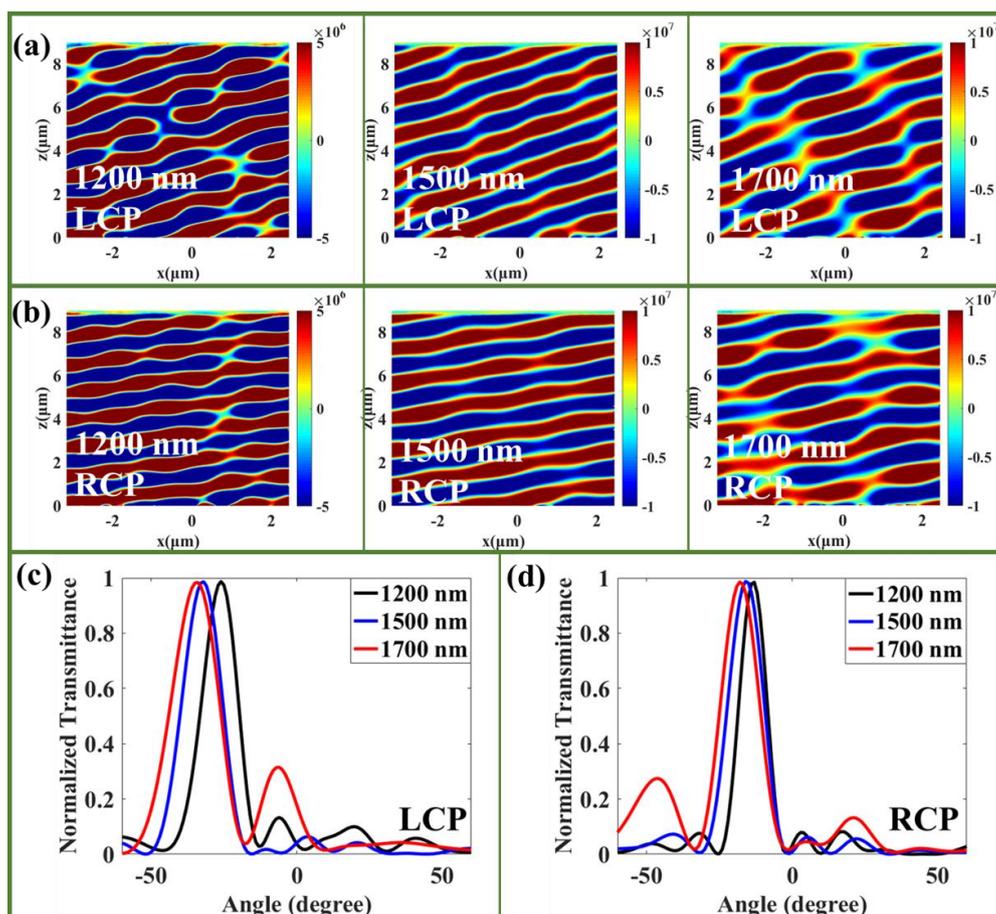


Figure S1. Electric field distributions of the bi-functional beam deflector under LCP (a) and RCP (b) incidences at the incident wavelengths of 1200, 1500, and 1700 nm respectively (The color scale units of the electric field are V/m.). The transmittances as a function of scattered angles under LCP (c) and RCP (d) incidences with different wavelengths.

Supplementary Note 2: Broadband characteristics of bi-functional metals

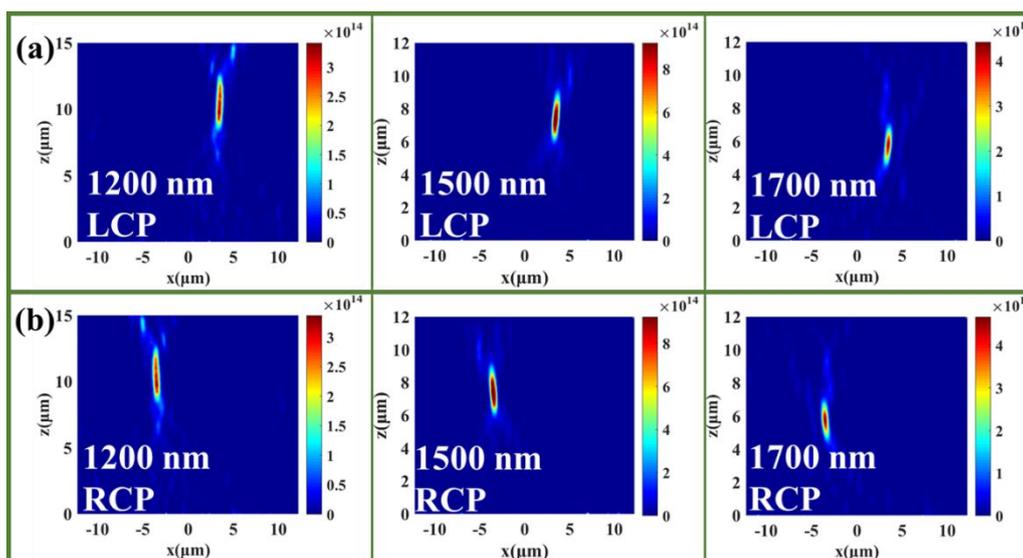


Figure S2. Intensity distributions of the bi-functional metals under LCP (a) and RCP (b) incidences at the incident wavelengths of 1200, 1500, and 1700 nm respectively (The color scale units of the intensity are $(V/m)^2$).

Supplementary Note 3: Broadband characteristics of BVPP.

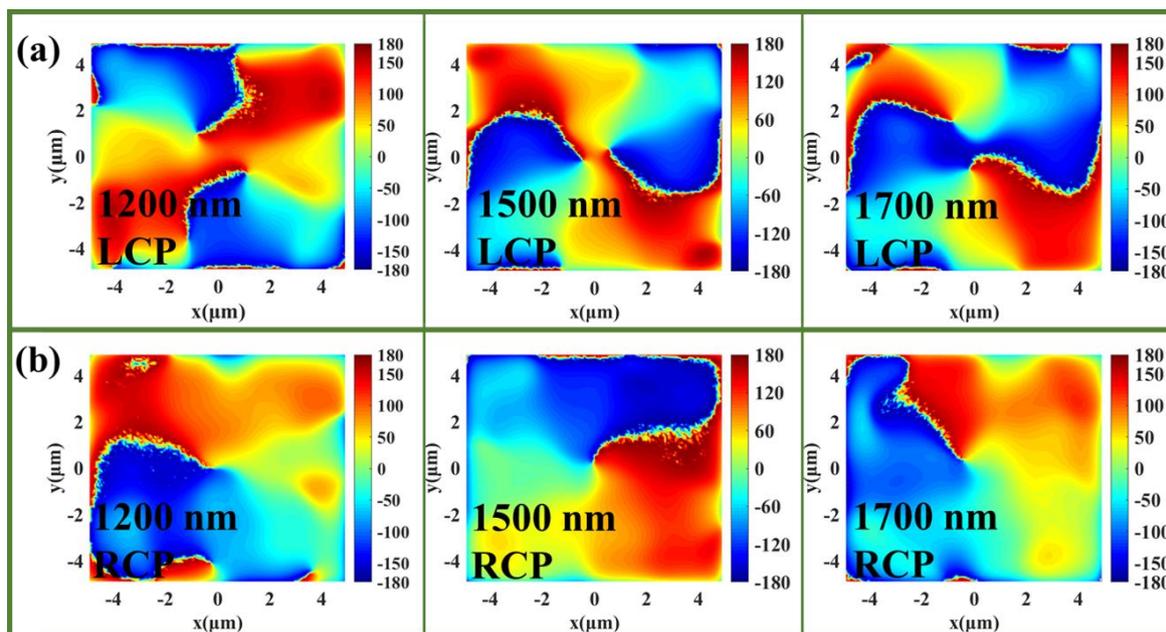


Figure S3. The phase distributions of the produced vortex beam under LCP (a) and RCP (b) incidences at the incident wavelengths of 1200, 1500, and 1700 nm respectively (The color scale unit of the phase is deg).

Supplementary Note 4: Broadband characteristics of one unit cell.

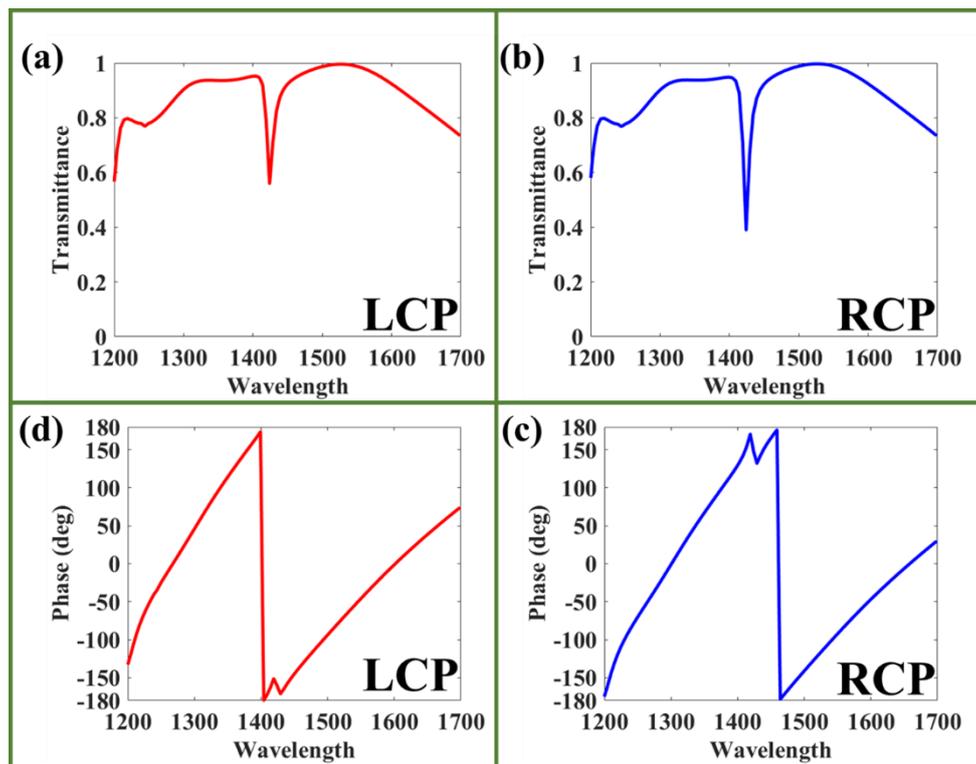


Figure S4. The transmittance (a) and phase (d) of transmitted light through the unit cells ($L=230$ nm, $W=390$ nm, $\theta=11.3^\circ$) for LCP incidence in the incident wavelength range of 1200-1700 nm. The transmittance (b) and phase (c) of transmitted light through the unit cells ($L=230$ nm, $W=390$ nm, $\theta=11.3^\circ$) for RCP incidence at the incident wavelength range of 1200-1700 nm.