Electronic Supplementary Material (ESI) for Nanoscale.

SUPPLEMENTARY INFORMATION

High Efficiency Focusing Vortex Generation and Detection with Polarization-insensitive Dielectric Metasurfaces"

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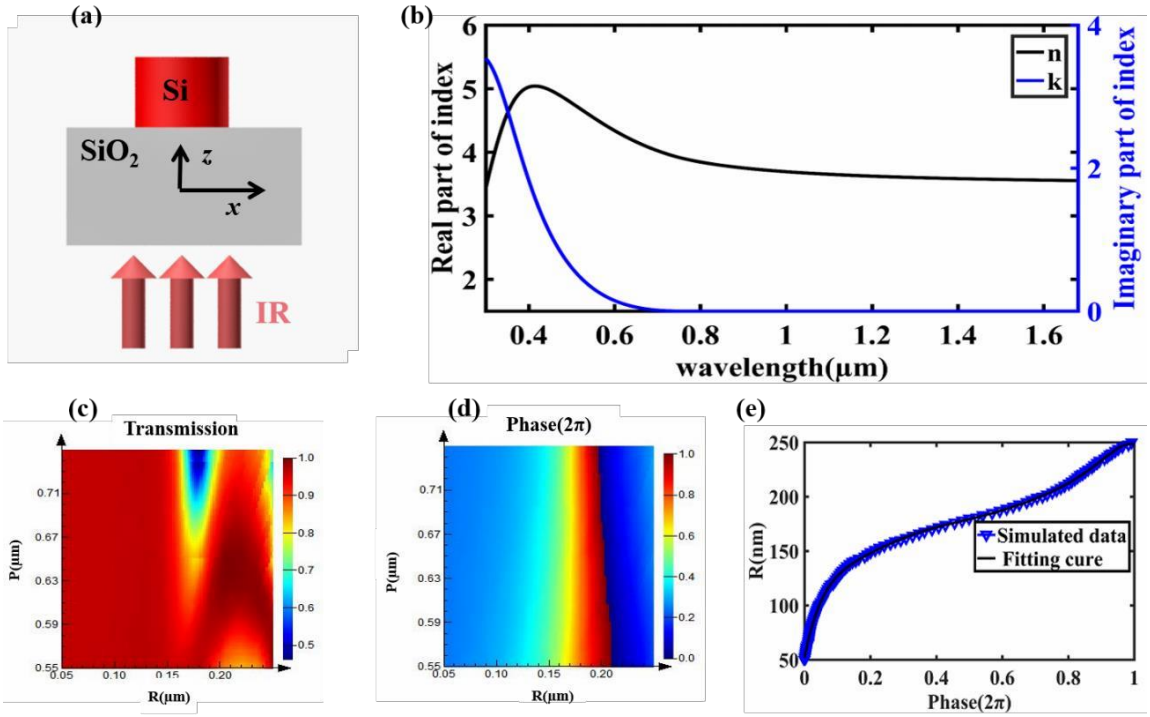
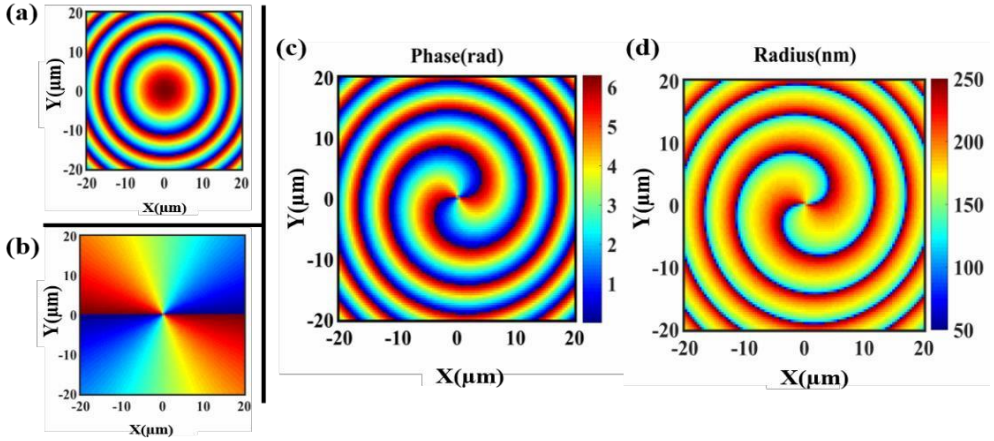
Fig. S1



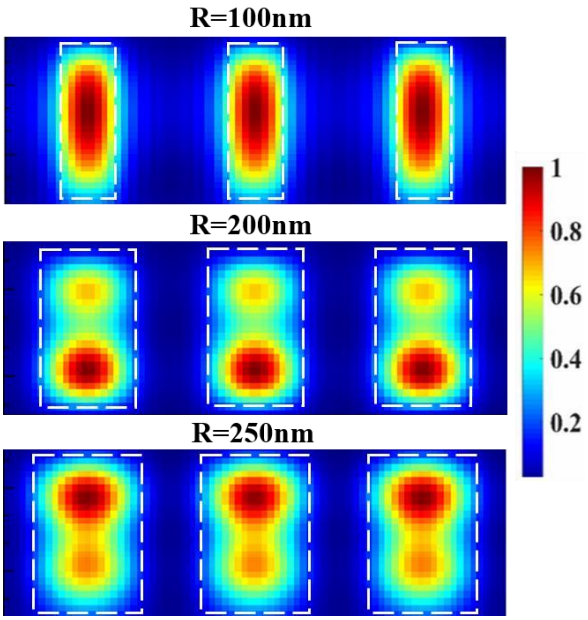
The design of the meta-atom and parameter sweep. (a) Side view of the meta-atom: Si nanopillar with radius R and height H (700 nm) in a square glass lattice with period P. **(b)** Experimental measured data for the refractive index of the amorphous silicon. **(c)** and **(d)** The swept results for the transmission and the phase shift function as R and P. All the simulated results are performed at the wavelength 1550nm with LCP incidence. **(e)** The polynomial fitting cure (black solid line) of the radius R functioning as phase shift.

Fig. S2



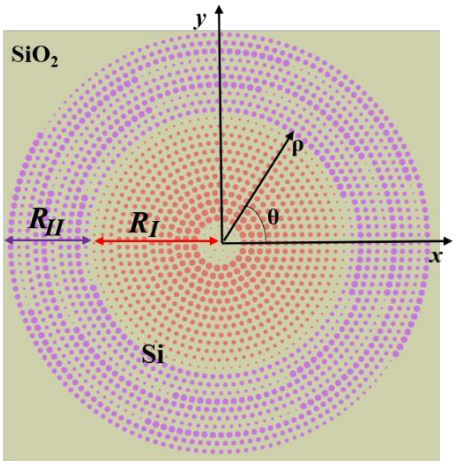
Design of FOV generator. **(a)** The phase distribution of spherical lens. **(b)** Spiral phase (l = 2) distribution in the x-y plane. **(c)** The phase distribution of the FOV generator. **(d)** Corresponding spatial distribution of the radius R of the Si nanoposts with the polynomial fitting cure.

Fig. S3



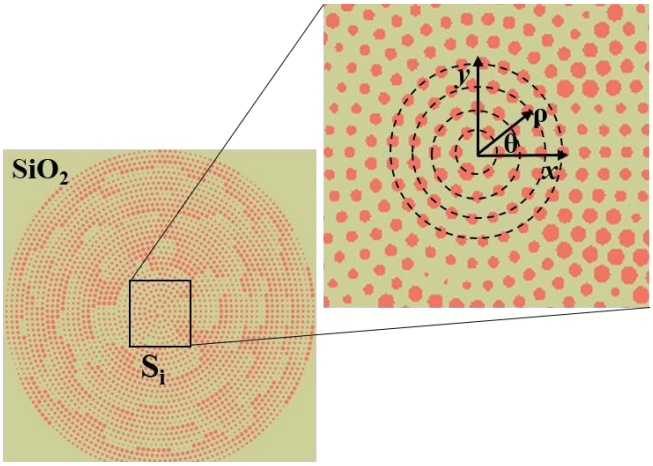
Simulated near-field distribution of the periodic meta-atoms arrays. Side views of the magnetic energy density in a periodic meta-atoms arrays for different post radii R. The dashed white lines depict the boundaries of the silicon posts.

Fig. S4



Top view of the FOV detectors. Region Ⅰ represents the AFA generator (a = 0.05μm$^{-0.5}$, ρ_0 =1.23μm), where the nanoposts positions are governed by Equation (2). Region Ⅱ is designed as a FOV generator with focal length 15μm and the nanoposts follows Equation (1). The radius (R_I) of the center area (region I) is 9.225μm, and the outer radius ($R_I + R_{II}$) of concentric circles (region II) is 15.375μm.

Fig. S5



Top view of multichannel FOV generator. All nanoposts (Si) are arranged in concentric circles and the radius of individual nanoposts are dictated by Eq. 4. The inset illustrates the details of the structure, where the radius of the first circle, the distance between two neighboring nanoposts (in the same circle) and that between two neighboring concentric circles are taken as P = 615nm.