High performance metalenses: numerical aperture, aberrations, chromaticity, and trade-offs: supplementary material

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S1. Spherical and coma aberrations for a large size metalens

To show the spherical and coma aberrations for a large size metalens, we conduct simulations on a metalens with a diameter of 1 mm, as shown in fig. S1. We observe the same effects as on the smaller lens shown in fig. 4 of the main paper. The parameter considered are:

- Focal length: 500 µm
- Diameter: 1 mm
- NA = 0.71
- Operating wavelength: 532 nm

S2. Evolution of the Point Spread Function (PSF)

Since the PSFs at different angles are more distant from each other than for the smaller lens shown in fig. 4, they are presented in separate plots in fig. S2.
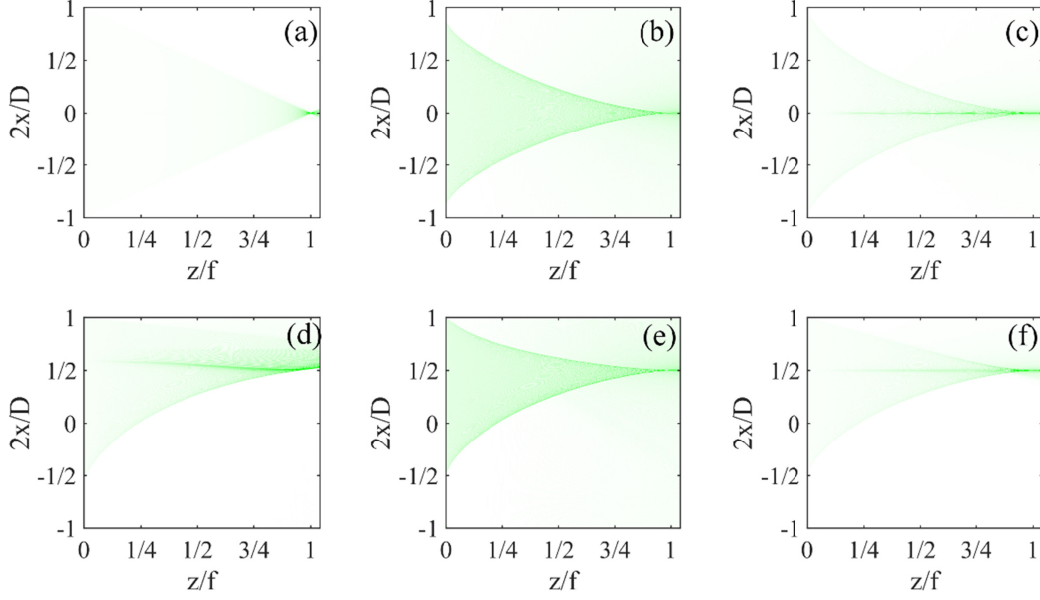
Fig. S1. Diffraction reconstructions of three metalenses (f=500 μm, D= 1 mm) with the following phase profiles: (a,d) Hyperbolic, (b,e) hyperbolic superimposed with optimized polynomial and (c,fi) spherical. The first and second rows show the longitudinal field distributions at normal and at oblique (30°) incidence, respectively. The operating wavelength is 532 nm

(a) Hyperbolic
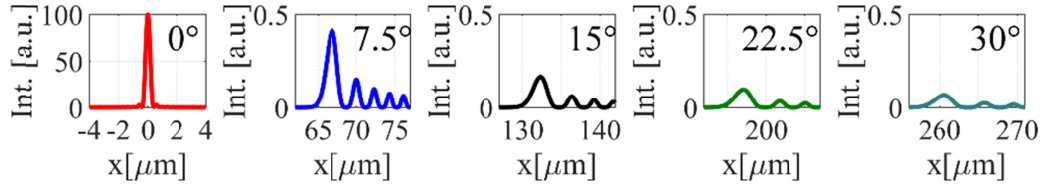
(b) Hyperbolic + polynomials
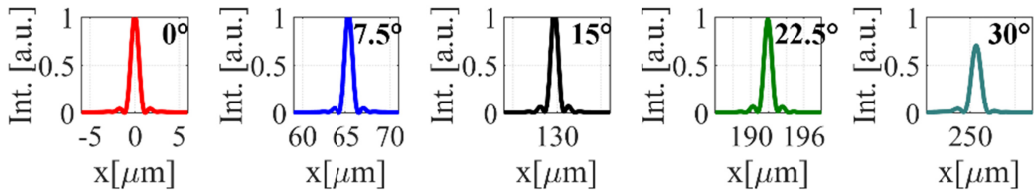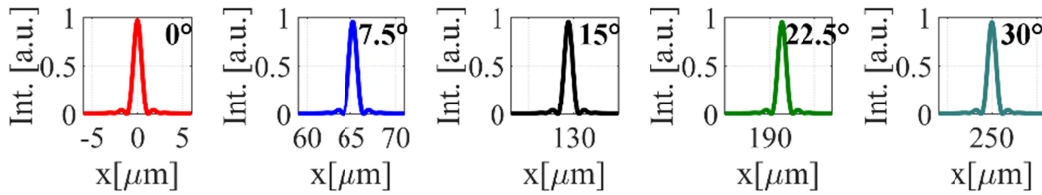

(c) Spherical:

Fig. S2. Evolution of the Point Spread Function for metalenses with (a) hyperbolic, (b) hyperbolic and polynomials, and (c) spherical phases at different oblique incidence