

Supplementary Information

A 3D-printed adaptive cloaking-illusion-integrated metasurface

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1. Geometric parameters

The geometric parameters l_y and l_x of 15 meta-atoms are listed in **Table S1**.

Table S1. The geometric parameter l_y and l_x of each meta-atom.

Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
l_y (mm)	2.41	7.31	6.52	6.26	6.18	6.19	6.29	6.58	7.37	2.00	4.71	5.19	5.41	5.57	5.75
l_x (mm)	4.99	5.40	5.59	5.80	6.28	2.00	5.11	5.43	5.63	5.86	6.52	3.92	5.21	5.48	5.67

2. Tolerances in the Fabrication

To ensure EM performance of the metasurface, the l_y and l_x dimensions on a group of meta-atoms were measured, and the relative errors were calculated. The results are listed in **Table S2**. It can be drawn from **Table S2** that the difference between the measured dimension and the designed dimension is relatively small, and the relative error is within 3%.

Table S2. Measured l_y and l_x dimensions of each meta-atom.

Number	Designed l_y (mm)	Measured l_y (mm)	Relative error (%)	Designed l_x (mm)	Measured l_x (mm)	Relative error (%)
1	2.41	2.48	2.90	4.99	5.02	0.60
2	7.31	7.34	0.41	5.40	5.46	1.11
3	6.52	6.59	1.07	5.59	5.63	0.72
4	6.26	6.29	0.48	5.80	5.84	0.69
5	6.18	6.20	0.32	6.28	6.29	0.16
6	6.19	6.23	0.65	2.00	2.03	1.50
7	6.29	6.32	0.48	5.11	5.12	0.20
8	6.58	6.59	0.15	5.44	5.49	0.92
9	7.37	7.38	0.14	5.63	5.65	0.36
10	2.00	2.05	2.50	5.86	5.91	0.85
11	4.71	4.76	1.06	6.52	6.55	0.46
12	5.19	5.21	0.39	3.92	3.94	0.51
13	5.41	5.48	1.29	5.21	5.25	0.77
14	5.57	5.60	0.54	5.48	5.49	0.18
15	5.75	5.77	0.35	5.67	5.69	0.35

It can be observed from **Fig. 2(b)** and **Fig. 2(d)**, the phase ϕ_{yy} and phase ϕ_{xx} are very sensitive to changes in geometric parameters l_y and l_x at different polarizations so that small changes in l_y and l_x will affect the corresponding phase. Further full-wave simulations were performed to verify the feasibility of this novel sample fabrication

method. In this part, the geometric parameters of l_y and l_x were measured value in **Table S2** and the boundary condition was consistent with the previous simulation. The reflected electric field distributions of the metasurface are shown in **Fig. S1**. Compared with the designed dimension metasurface, the reflected electric field distributions of the measured dimension metasurface remain almost unchanged, and they also behave the predesigned functions at both E_y and E_x polarizations. These simulation results validate the feasibility of the employed fabrication technique to implement the metasurface precisely.

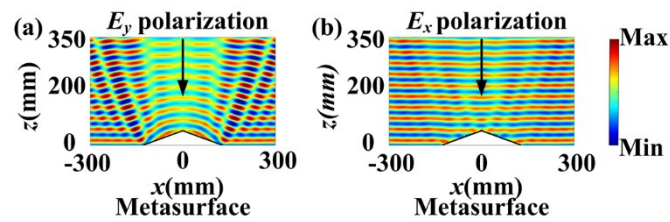


Fig. S1. Full-wave simulation results for the measured dimension metasurface at the normal incidence. (a) The reflected electric field distribution of the measured dimension metasurface at the E_y polarization. (b) The reflected electric field distribution of the measured dimension metasurface at the E_x polarization.

2. Photograph of the measurement setup

Photograph of the measurement setup is shown in **Fig. S2**.



Fig. S2. Photograph of the measurement setup.