Supplementary Information

Single-step manufacturing of hierarchical dielectric metalens in the visible

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Supplementary Figure 1

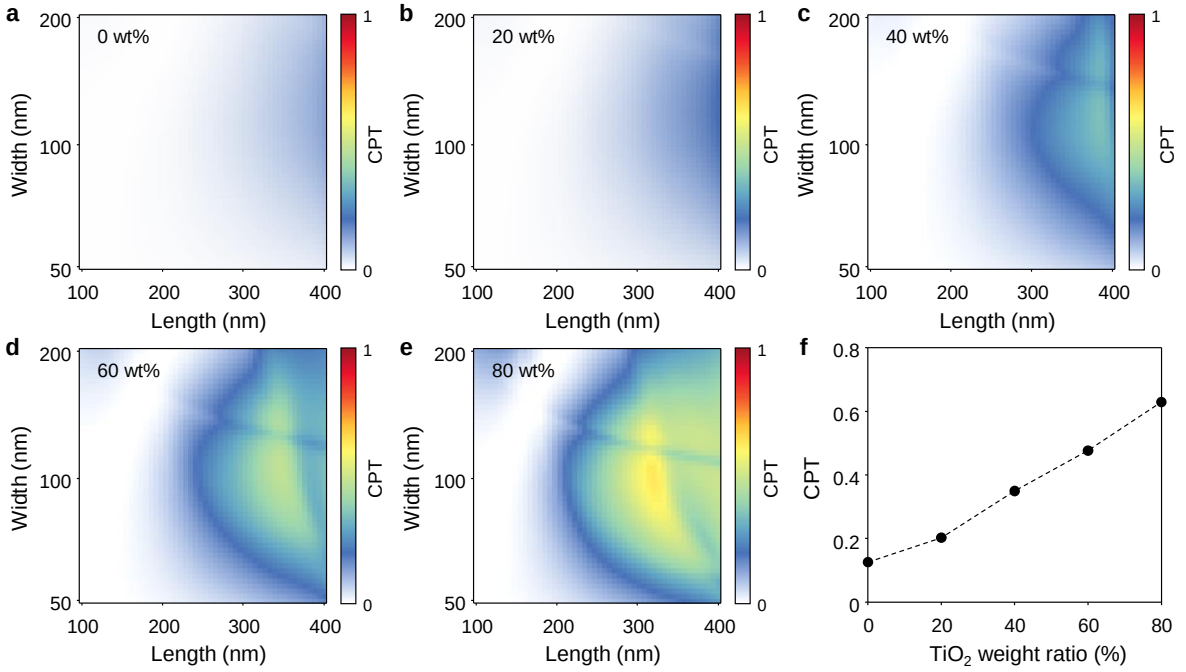

Figure 1. The effect of titanium dioxide (TiO_2) weight ratio on the metalens efficiency at the wavelength of 532 nm. **a-e** Calculated cross-polarization transmittance (CPT) of rectangular nanostructures using measured refractive indices of the nanoparticle composite. Height: 720 nm; pitch: 450 nm. The length varies from 100 nm to 400 nm while the width varies from 50 nm to 200 nm. **f** The maximum CPT variation according to the TiO_2 weight ratio. The dashed line is to guide the eye.

Supplementary Table 1

Table 1. Comparison of our method with typical nanoimprint lithography in the fabrication of dielectric metasurfaces

	Nanoimprint lithography (TiO_2 or GaN)	This work
Thin-film deposition	Necessary	Unnecessary
Thin-film etching	Necessary	Unnecessary
Patterning on flexible substrate	Not easy due to thermal damages from thin film deposition or etching steps	Possible
Optical properties	Controllable but very limited	Widely controllable by the content of nanoparticles
General replication procedure	1. Thin-film deposition on a substrate 2. Dropping the resist on the film 3. UV-NIL with a printing mold 4. Residue layer removal 5. Dry etching of the thin film 6. Resist residue removal	1. Dropping the NPC on a substrate 2. UV-NIL with a printing mold

TiO_2: titanium dioxide; GaN: gallium nitride; NPC: nanoparticle composite; NIL: nanoimprint lithography.

Supplementary Figure 2

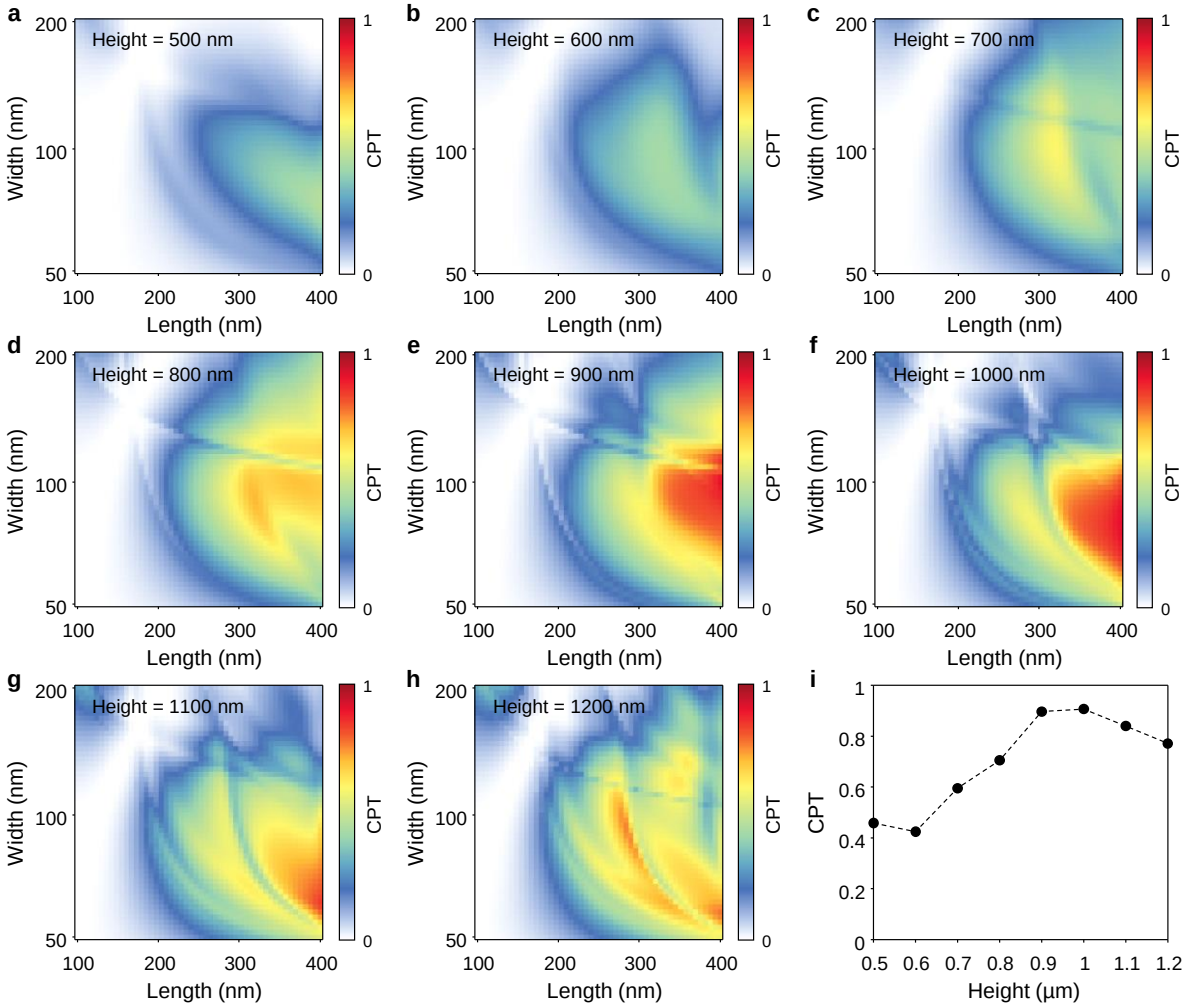

Figure 2. The effect of the structure height on the metalens efficiency at the wavelength of 532 nm. **a-h** Calculated cross-polarization transmittance (CPT) of rectangular nanostructures based on the nanoparticle composite. Pitch: 450 nm. The length varies from 100 nm to 400 nm while the width varies from 50 nm to 200 nm. **i** The maximum CPT variation according to the structure height. The dashed line is to guide the eye.