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An ultrathin invisibility skin cloak for visible light ZI JING WONG, XINGJIE NI, MICHAEL MREJEN, YUAN WANG, XIANG ZHANG, University of California, Berkeley — Metamaterial-based optical cloaks have thus far used volumetric distribution of the material properties to gradually bend light and thereby obscure the cloaked region. Hence, they are bulky and hard to scale up to macroscopic sizes. In addition, typical carpet cloaks introduce unnecessary phase shifts in the reflected light, making the cloaks detectable. Here, we demonstrate experimentally an ultrathin invisibility skin cloak wrapped over an object. This skin cloak conceals a three-dimensional arbitrarily shaped object by complete restoration of the phase of the reflected light at 730-nanometer wavelength. The skin cloak comprises a metasurface with distributed phase shifts rerouting light and rendering the object invisible. In contrast to bulky cloaks with volumetric index variation, our device is only 80 nanometer (about one-ninth of the wavelength) thick and potentially scalable to hide macroscopic objects.

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