3-D Terahertz cloaking

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Invisibility appears to be the next possible advance in the use of Terahertz radiation in medicine, security, and communications.

A research team from Northwestern and Oklahoma State universities claims to be first to cloak a three-dimensional object from view in a broad range of Terahertz frequency light, which lies between infrared and microwaves. The team's paper will be presented at this year's Conference on Lasers and Electro Optics (CLEO: 2011, May 1 - 6 in Baltimore).

In the team's paper, Cheng Sun of Northwestern describes how a rigid sponge-like cloaking structure less than 10 millimeters long on a side was built up in 220 layers, each precisely defined to vary the index of refraction and bend light to render invisible anything located beneath a shallow concave bump on the cloak's bottom surface. The group showed that both the physical geometry and the spectrographic signature of a chemical strip about the width of 10 human hairs disappeared when cloaked.

Despite its Harry Potter-like allure, concealing tiny objects from view is not the team's ultimate goal, Sun said. Rather, this latest demonstration shows that the new "transformation optics" principles and 3-D lithography techniques they used to make the cloak can also enable optical components for guiding, collimating, and focusing terahertz light in a variety of ways—in new medical and scientific diagnostic tools, airport security scanners, and data communication devices.

More information: Presentation, CWA5, “Three-dimensional Terahertz Cloak,” by Cheng Sun et al. is at 1:30 p.m. Wednesday, May 4.

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