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Scientists Create New "Invisible" Material

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by Tina Casey

Forget the merely invisible, scientists at Columbia Engineering School have created a new material that behaves as if it doesn't even exist, at least when it comes to light. The new material is a nanoscale structure that allows light to pass through as if it was traversing empty space. In very general terms, that means the light does not slow down or "bend" when it exits the material. The discovery could lead to a new generation of highly precise and efficient photonic devices, especially in fiberoptic telecommunications equipment. Somewhat ironically, this invisible-behaving material that is not actually invisible could also be used to create a real life Invisibility Cloak, at least for small objects. The full study is available at Nature Photonics.

Nanoscale Metamaterials

The new material is a "metamaterial," an artificial material possessing unique properties that may not occur in nature. In this case, the Columbia scientists "sculpted" a cascading series of nanostructures (a nano is one billionth of a meter) that are smaller than light waves. The result is a material that reverses what you would normally expect when light passes through a substance.

Getting Light to Behave the Way You Want

Normal materials have a positive refractive index, which refers to the speed of light passing through a material, relative to its speed in a vacuum. The refractive index is also related to the bending of light as it passes through a material like a glass prism, for example. The new metamaterial creates a sort of artificial vacuum with a refractive index of zero. When used to create chips for photonic devices, the metamaterial would enable precise control over the flow of light. Advanced telecommunications and consumer devices are just a couple of examples of potential applications for the new chips, which could also find numerous applications in emerging robotics fields.

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