Electrical Signals Dictate Optical Properties

University of Southampton

Researchers at the University of Southampton's [1] Optoelectronics Research Centre (ORC) have created an artificial material, a metamaterial, with optical properties that can be controlled by electric signals.

Photonic metamaterials are artificial materials created by precise and extremely fine structuring of conventional media using nanotechnology. They offer numerous new applications from cloaking to radically improved solar cells. However, the properties of metamaterials are usually fixed.

Dr Eric Plum, Research Lecturer at the ORC, explains: "We have found a fast and reliable way of coordinating the motion of thousands of metamaterial building blocks. We shift them by distances smaller than the diameter of a human hair. These minute rearrangements are sufficient to radically change the transmission and reflection characteristics of the metamaterial.

We do this by engaging the same force that sticks a small piece of paper to a comb after brushing. In essence, we dictate the movement of metamaterial building blocks with electrical signals, and we can do this very fast."

Seen as an enabling technology of the future, metamaterials research has grown rapidly in the past decade. The University's Centre for Photonic Metamaterials is supported by the Engineering and Physical Sciences Research Council and is at the forefront of this development. Director of the Centre Professor Nikolay Zheludev says: "Thanks to nanotechnology we need not depend only on natural materials; we can now engineer optical properties and change them at will. Light-enabled technologies are vital to the 21st century and photonic metamaterials will have a broad impact."

For more information visit http://www.southampton.ac.uk [1].

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[1] http://www.southampton.ac.uk