Jan 04 2016 : The Times of India (Delhi)

A new metamaterial for faster PCs

PTI

Scientists Claim It Can Even Be Used To Create `Invisibility Cloaks'

A new metamaterial hat refracts light in an unusual way could be used to speed up computers, and even create invisibility cloaks, scientists say.

Scientists from Moscow Insti ute of Physics and Technology and the Russian Academy of Sciences have proposed a two-dimensional metamaterial composed of silver elements. These structures may be used to develop compact optical devices, as well as to create an `invisibility cloak'. Computer simulations showed that it would be a high performance material or light with a wavelength from 400-500 nanometres (violet, blue and light blue), researchers said.

A metamaterial has proper ies which are created by an arti ficial periodic structure.

When light is incident on the surface of such a material, the refracted light is on the same side of the normal to the surface as the incident light. The unusual optical effects do not necessarily imply the use of the 3D metamaterials.Light can also be manipulated with the help of two-dimensional structures metasurfaces, researchers said. In fact, it is a thin film composed of individual elements.

The principle of operation of the metasurface is based on the phenomenon of diffraction. Any flat periodic array can be viewed as a diffraction lattice, which splits the incident light into a few rays. The number and direction of the rays depends on geometrical parameters -the angle of incidence, wavelength and the period of the lattice. The structure of the unit cell determines how the energy of the incident light is distributed between the rays.

For a negative refractive index it is necessary that all but one of the diffraction rays are suppressed, then all of the incident light will be directed in the required direction. The unit cell of the proposed lattice is composed of a pair of closely spaced silver cylinders with a radius of the order of 100 nanometres. Researchers were able to adjust the parameters of the cell so that the resulting optical lattice response is consistent with abnormal refraction of the incident wave.

The results achieved can be applied to control optical signals in ultra-compact devices, optical transmission and information processing technologies, which will help expedite computer processing in the future.