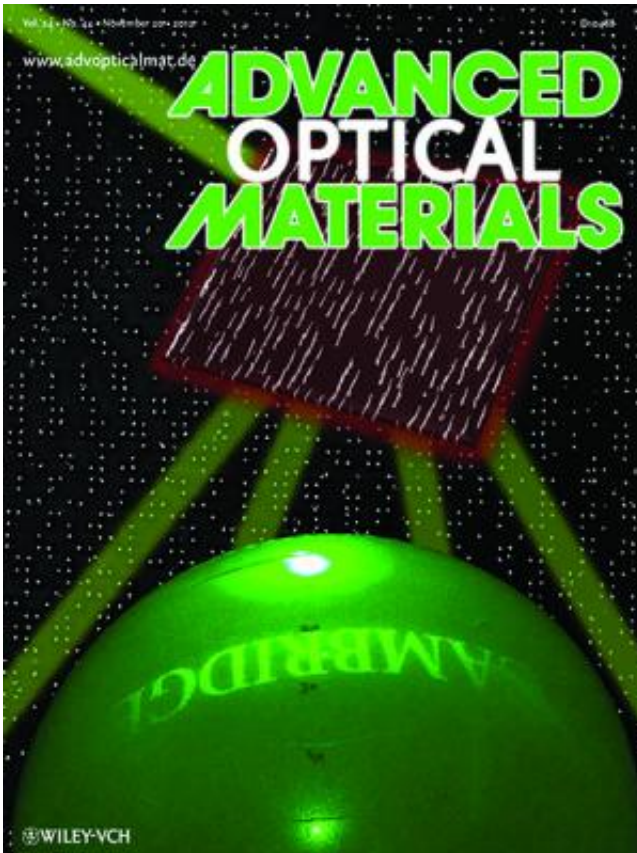


High-res holograms from carbon nanotubes

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Cover image of *Advanced Optical Materials* journal. Credit: Dr Haider Butt, Yunuen Montelongo, Tim Butler, Dr. Timothy D. Wilkinson and Professor Gehan A. J. Amaratunga

(Phys.org) —Researchers from the University of Cambridge's Department of Engineering have demonstrated the novel utilisation of carbon nanotubes for making high resolution holograms.

The research has been highlighted in several prestigious journals including *Nature* and also as the cover image of the journal *Advanced Optical Materials*.

Carbon nanotubes - a manmade material - have been the focus of an enormous amount of research during the last decade due to their extraordinary electrical and optical properties. These tubes are many times thinner than a wavelength of visible light which makes them promising candidates for being used as pixels.

"The size of pixels is one of the key limiting features in state-of-the-art holographic display systems," said researchers Dr Haider Butt, who conducted the work along with Yunuen Montelongo, both from the Centre of Molecular Materials for Photonics and Electronics (CMMPE) group at the Department of Engineering.

The researchers have produced holograms using the smallest pixels yet - carbon nanotubes. Due to the nanoscale dimensions of the [carbon nanotube](#) array, the image presented a wide field of view and high resolution.

As reported in their article (published in the journal *Advanced Optical Materials*), the researchers first calculated the exact placement pattern for carbon nanotubes within the hologram that would produce a "CAMBRIDGE" image when illuminated by light. Based on calculations, the nanofabrication of a hologram consisting of vertically aligned carbon nanotubes was performed on [silicon substrate](#). The [nanofabrication](#) process was mostly performed by Tim Butler from the Department of Engineering's Electronics, Power and [Energy Conversion](#) (EPEC) Research Group.

When the fabricated [hologram](#) was illuminated by laser, very high contrast and wide field of view images of the word "CAMBRIDGE"

were observed. This work is a breakthrough in the field of holographic technology as it reports the original use of nanostructures for producing holograms.

More information: "Optics: Nanotube holograms", S. Larouche and D. R. Smith, *Nature* 491, 47 (2012). [www.nature.com/nature/journal/ ... 22/full/491047a.html](http://www.nature.com/nature/journal/.../22/full/491047a.html)

"Carbon nanotubes based high resolution holograms" *Advanced Materials*, 2012. [onlinelibrary.wiley.com/doi/10 ... a.201290286/abstract](http://onlinelibrary.wiley.com/doi/10...a.201290286/abstract)

Provided by University of Cambridge

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