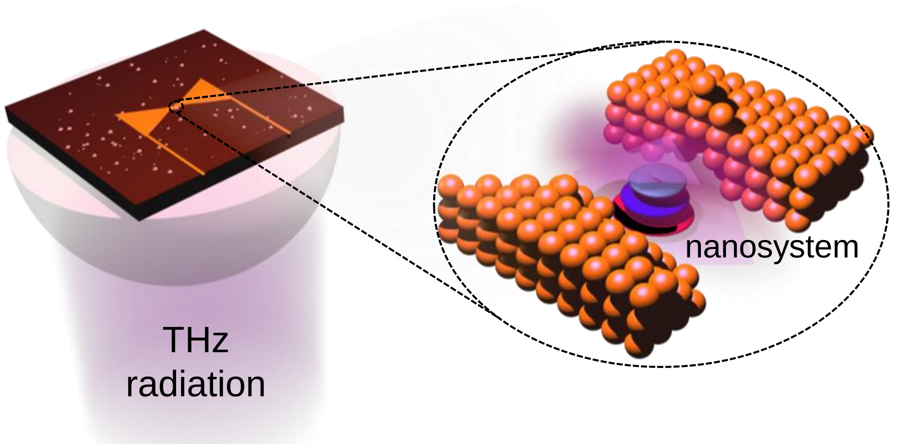
Release Date: December 20, 2021

LAM | Latest publications from prestigious teams

Light: Advanced Manufacturing published three reviews and one article

1. LAM review | Deep-nanometer-scale terahertz spectroscopy using a transistor geometry with metal nanogap electrodes

THz spectroscopy has become a powerful tool for characterizing electronic properties and vibronic excitations in various kinds of materials. Recently, the need to understand electronic and vibronic excitations at the nanometer (nm) scale has emerged for realization of state-of-the-art quantum nanodevices and synthesis of new molecules for medicine. However, performing THz spectroscopy at the nm scale is extremely challenging because the diffraction limit of electromagnetic waves hinders tight focusing of THz radiation down to the nm scale. A team from University of Tokyo and Tokyo University of Agriculture and Technology has introduced a novel technique of using metal nanogap electrodes for deep-nanoscale THz spectroscopy, which provides a major scientific basis for creating nanodevices with new functions.



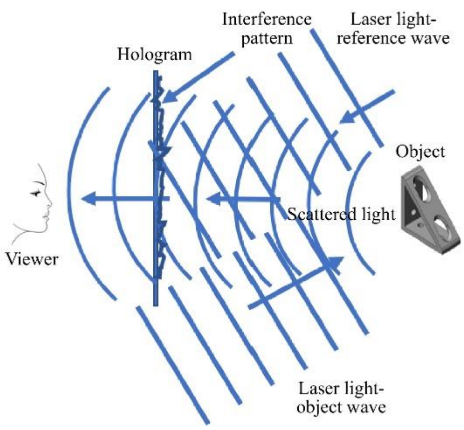
Caption | Schematic of the deep-nanometer-scale terahertz spectroscopy using a transistor geometry with metal nanogap electrodes.

See the article:

Ya Zhang, Shaoqing Du, Kazuhiko Hirakawa. Deep-nanometer-scale terahertz spectroscopy using a transistor geometry with metal nanogap electrodes[J]. Light: Advanced Manufacturing. https://doi.org/10.37188/lam.2021.031

2. LAM review | The language of holography

Holography's 70+ years evolution across diverse communities produced a complex language that is sometimes inconsistent, confusing, and incorrect, resulting in a general public that often appears widely confused or ignorant regarding what holograms actually are and are not. Can and should we correct this situation, or are we stuck with every 3D image being called a hologram? Beginning with the insights provided by the pioneers of the field, we set the stage for a more useful holography language and definitions that can be understandable and usable by specific audiences. Such knowledge can help the general public to take greater interest and enjoyment in holography; this would also be beneficial to those more involved in holography. This study examines the language, it's problems, and potential solutions. Accordingly, this article offers advice for achieving this result.



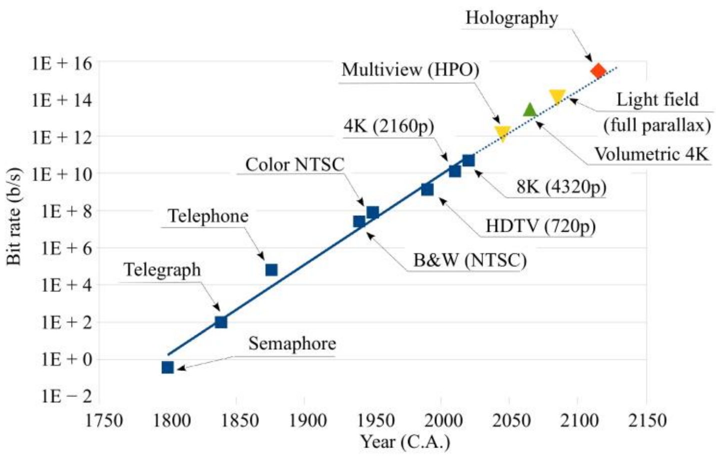
Caption | Recording a hologram of an object.

See the article:

James D. Trolinger. The language of holography[J]. Light: Advanced Manufacturing. https://doi.org/10.37188/lam.2021.034

3. LAM review | Holography, and the future of 3D display

The pioneers of holography, Gabor, Leith, Upatnieks, and Denisyuk, predicted very early that the ultimate 3D display will be based on this technique. This conviction was rooted on the fact that holography is the only approach that can render all optical cues interpreted by the human visual system. In this review article, Dr. Pierre-Alexandre Blanche from the University of Arizona, USA, is discussing the recent accomplishments made in the field of holographic 3D display. More specifically, the real time computation of holograms with neural networks and other algorithms, the efficient transmission and distribution of the information over long distance, and the new diffractive elements allowing the rendering of the holograms in various 3D display setups.



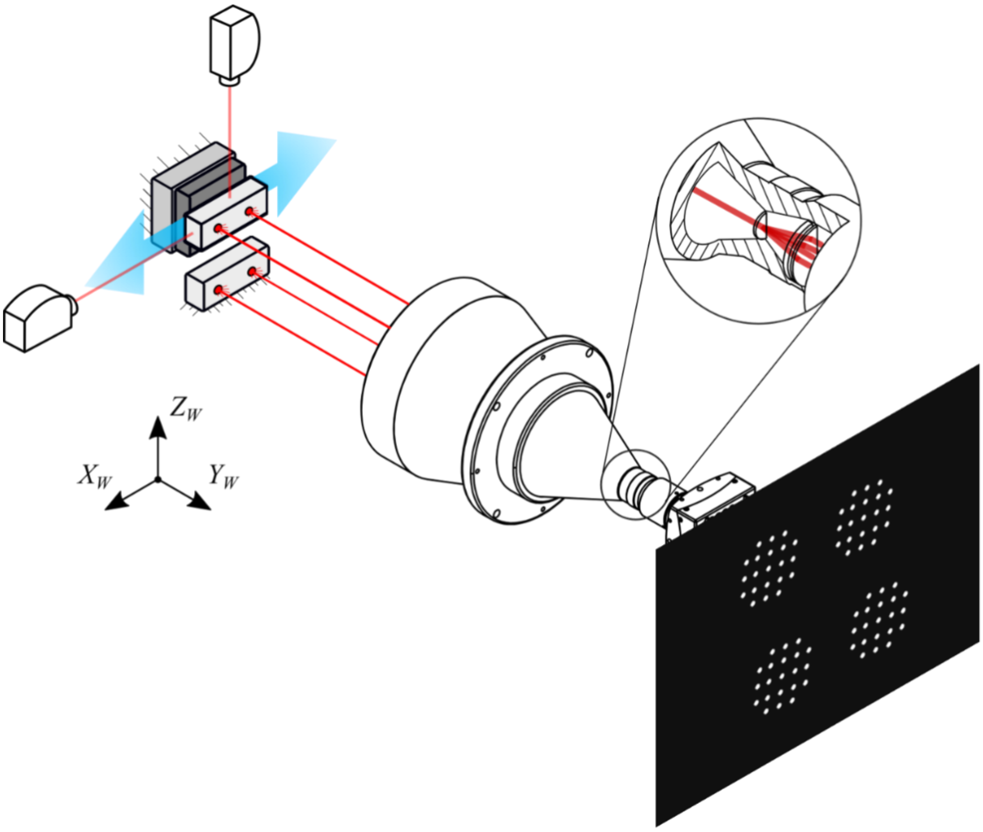
Caption | Stairway to holography: approximate bit rate magnitude of various telecommunication devices according to their year of introduction.

See the article:

Pierre-Alexandre Blanche. Holography, and the future of 3D display[J]. Light: Advanced Manufacturing. https://doi.org/10.37188/lam.2021.028

4. LAM article | Multi-positional image-based vibration measurement by holographic image replication

They present an imaging based vibration measurement method, that can detect in-plane vibration amplitudes of 100 nm at multiple object points in a field of 140 mm x 110 mm. The measurement method is based on imaging of single point light sources onto a camera. The classical approach to measure the object position is to calculate the center of the resulting spot in image plane. With their method this single spot is replicated into a predefined pattern of spots. Therefore, the imaging lens is upgraded with an optical element, a so called computer generated hologram, to perform this replication. By averaging the center positions of all replicated spots, the precision of position measurement can be improved by a factor equal to the square root of the number of replications.



Caption | Holographic multi-image replication is used to measure vibrations in a wide field with a resolution of 100 nm and frequencies up to 1000 Hz.

See the article:

Simon Hartlieb, Michael Ringkowski, Tobias Haist, Oliver Sawodny, Wolfgang Osten. Multi-positional image-based vibration measurement by holographic image replication[J]. Light: Advanced Manufacturing.
https://doi.org/10.37188/lam.2021.032

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