Detecting the first tera hertz photon by "Carbon nano-tube artificial atom": new step toward a single photon detector of "tera hertz wave"

There are several types of light, for example, known as X-ray, infra-red light or ultra-violet light. Among them, "tera hertz wave" attracts central attention from relevant researchers. Tera hertz (THz) wave seems to be very promising light to observe the direct molecular dynamics unseen hitherto and will find medical diagnostic application, in particular, for breast cancer. The generation and detection of tera hertz light has been believed to be very difficult and unexplored.

Light has both wave and particle properties. Light particle is called "Photon". Advanced Device Laboratory in Discovery Research Institute succeeded in the detection of a THz photon for the first time in the world by use of a novel nanodevice, "carbon nano-tube artificial atom." The group postulated that carbon nano-tube which is a form of tube made from carbon atoms with nano-meters-order diameter might capture and stabilize electrons in the differentiated state of potential energy just as in atoms, and, thus, the internal electrons would behave as in "artificial atoms." When a transistor made from the tube was excited by THz photons, the emission of the internal electrons in the tube was detected on the cathode, the phenomenon of which is a well-known principle as Einstein's photoconductive effect.

The present outcome will lead the research and development of quite new and most-sensitive detectors for tera hertz wave.

The research briefing will be presented in the following international meetings; at Odaiba, Tokyo on July 15, at Ween, Australia on July 24, and at Basel, Switzerland on July 30, 2006.
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