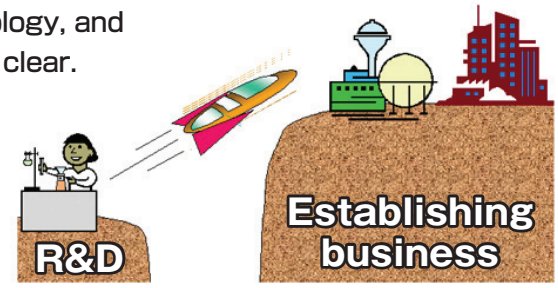
Fujitsu's Nanotechnology Approach to Business

Fujitsu has been promoting research in the area of nanotechnology, and from the results, their value in the target markets is becoming clear. At the "nano tech 2007" exhibition, Fujitsu displays its nanotechnology being close to ready for practical use, in conjunction with its target market.



Viewpoints

Quantum-dot technology and the launch of QD laser, Inc. to achieve commercialization

Quantum-dot technology for optical communication

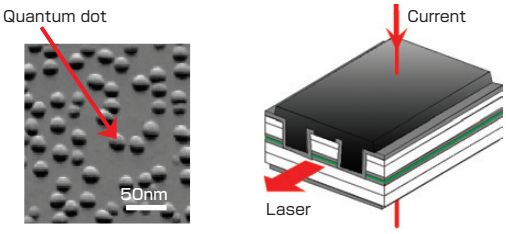
Quantum-dot optical devices using semiconductor particles 20 nm in diameter are revolutionary optical devices that are significantly superior to conventional ones. Their high performance is evident in their low power consumption, high speed, and unprecedented functions. It is also possible to produce low-cost devices because of low-cost GaAs substrates.

Fujitsu has achieved the world's first room-temperature continuous-wave laser operation at 1.3 mm, with temperature independent 10Gb/s modulation of the lasers. Fujitsu has also provided cutting-edge technologies that can be used in the future, such as broadband high-power quantum-dot optical amplifiers that enable multi-wavelength channel amplification as well as single-photon light sources operating in the 1.3 to 155 mm wavelength range for high-speed quantum encryption data transmission.

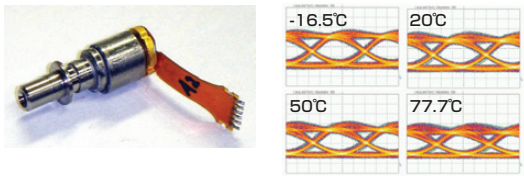
On April 24, 2006, Fujitsu and Mitsui & Co., Ltd. launched an optical device venture named QD Laser, Inc. dedicated to the commercialization of quantum-dot optical devices.

The operating characteristics of quantum-dot optical devices and their applications will be presented as well as the activities in which QD Laser, Inc. is engaged.

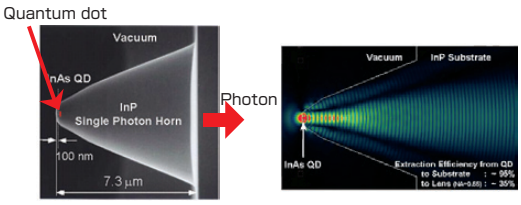
■This work is supported by the IT program, MEXT and the Photonic Network Project, which OITDA contracted with NEDO.



Quantum-dot laser



Laser module (TOSA) and 10-Gbps modulation



Single-photon source

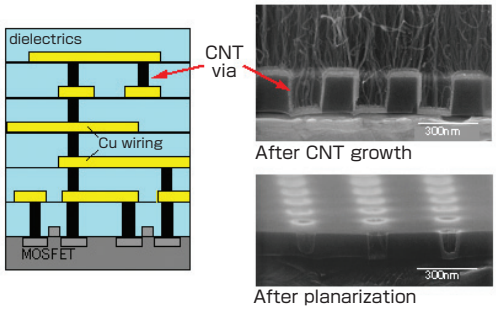
CNT interconnect technologies move closer to reality through a semiconductor consortium

CNT interconnect for future LSIs

Fujitsu is studying carbon nanotube (CNT) interconnect technologies, which use metallic CNTs. The aim is to solve problems associated with LSI interconnects in the half-pitch 32 nm node and beyond. The technologies, which have been led by Fujitsu, are now being developed for practical use at a semiconductor consortium, Selete, supported by the NEDO MIRAI project. Members of the program include Fujitsu, Toshiba, Panasonic, Ulvac and Waseda University.

At the exhibition, we exhibits a CNT-developed 300 mm-diameter wafer and a substrate with CNT via interconnects planarized by chemical mechanical polishing. Fujitsu is also introducing applications of CNTs to heat removal from electronic devices, which are solely developed by Fujitsu.

■The work was partly completed under Selete management as part of the MIRAI project supported by NEDO.



Fujitsu's Nanotechnology Approach to Business

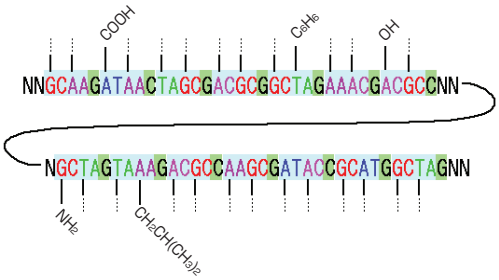
Success in proof of concept of antibody substitution technology

Artificial antibody (Modified aptamer)

New materials and a design technology have been developed to achieve an substitute for the monoclonal antibody used as a clinical examination and a biotechnology research tool, and a technology platform has been successfully established. The modified aptamer having a backbone resembling to nucleic acid presents many kinds of chemical side chains simultaneously.

To accelerate practical use of the modified aptamer as a reagents for research and diagnostic applications, it is open for discussion with other organization about external collaboration.

In the exhibition, Fujitsu presents an intended activities for practical use and an outline of the technology.



Schematic drawing of the modified aptamer

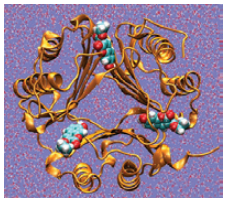
■This work was partly supported by the high-through-put biomolecule analysis system project of NEDO.

Accurate and reliable computer simulations for drug design

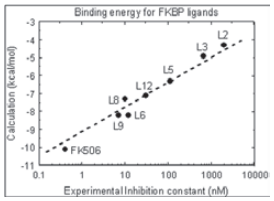
Absolute free energy calculation in protein-ligand binding

To achieve reliable "in silico" screening for drug discovery, it is necessary to obtain absolute binding affinity of the protein-ligand complex with a high level of accuracy. The technique for evaluating the change in free energy using the multi-stage acceptance ratio based on non-equilibrium work theory has been developed. We can predict the absolute protein-ligand binding free energy from computer simulations with an accuracy of 1 kcal/mol using a PC cluster.

At the exhibition, Fujitsu will describe the calculation framework and demonstrate a typical animation of a model in time evolution.



Snapshot of protein (MIF)-ligand complex in solvent



Comparison between computed values and experimental values (FKBP-8ligands).

■This work was partly supported by the high-through-put biomolecule analysis system project of NEDO

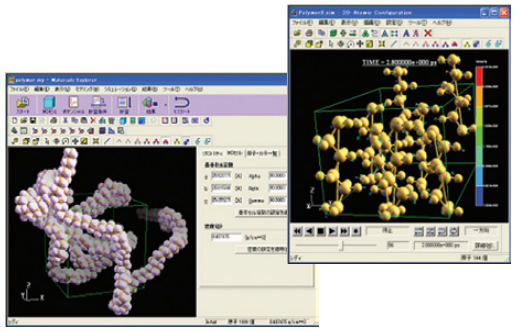
Simulation software products for designing nano materials

Simulation for the new materials design

Simulations can help us to understand physical/chemical phenomena at the atomistic and molecular scale. This is useful for nanotechnology materials development. Fujitsu is providing software to do simulations for a wide range of materials mainly using the Molecular Orbital and Molecular Dynamics methods.

Fujitsu's molecular dynamics software, Materials Explorer, can handle a wide range of materials from bulk amorphous polymers to organic and inorganic materials. This software will be demonstrated at the Fujitsu booth.

Related products: WinMOPAC, SynthPath Explorer
URL: http://software.fujitsu.com/jp/chem/



Materials Explorer 4.0 Professional/Ultra

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