나노- 바이오 기술
(Nano-bio Technology)

개 요

1 . 나노-바이오 기술(NIT)의 개념

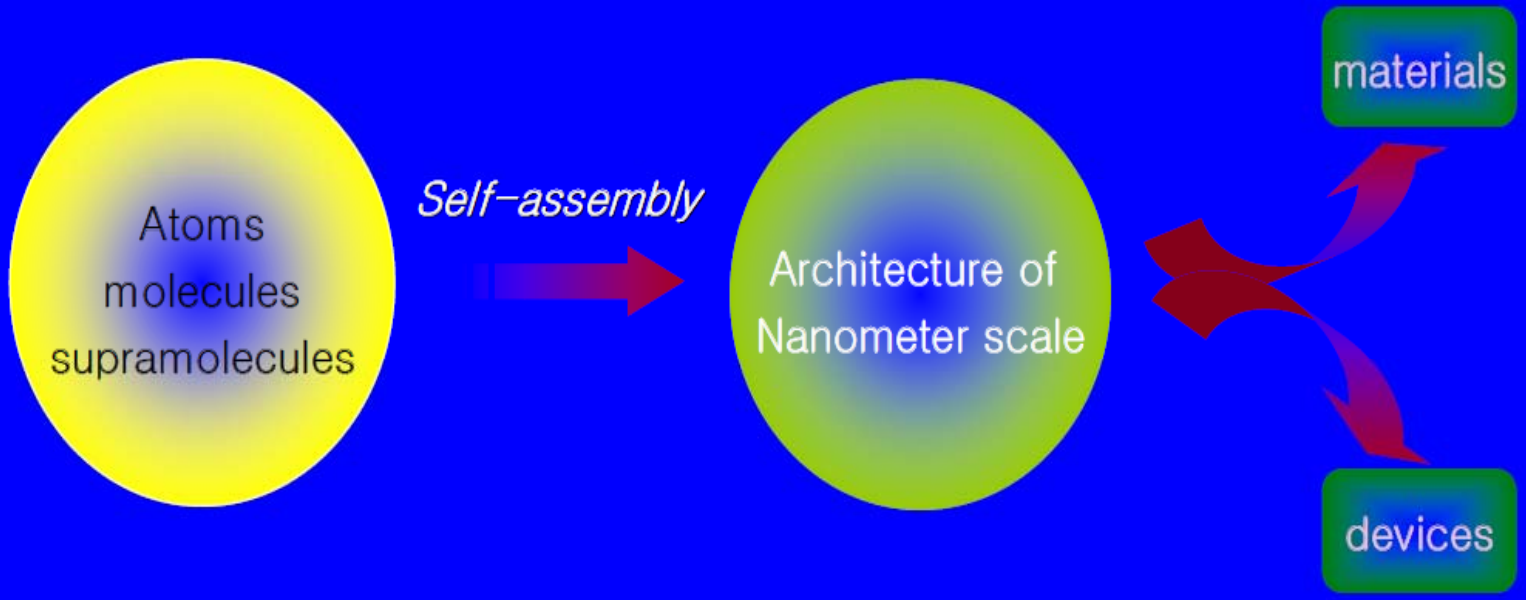
2 . NIT 융합기술의 유형

Nanotechnology

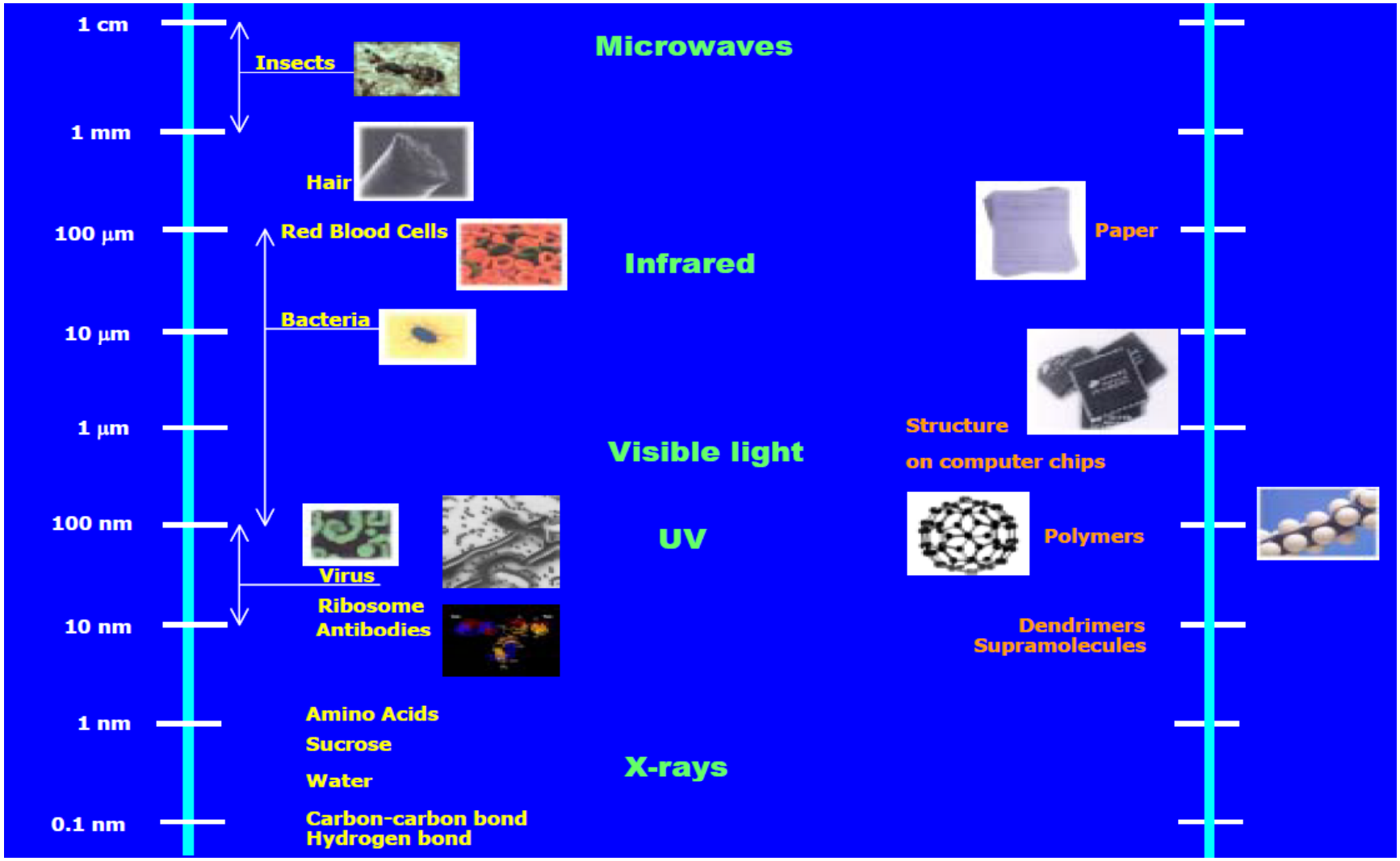
Nanoscience and **technology** is an area of science and technology that will most likely produce the breakthroughs of tomorrow.

Neal Lane

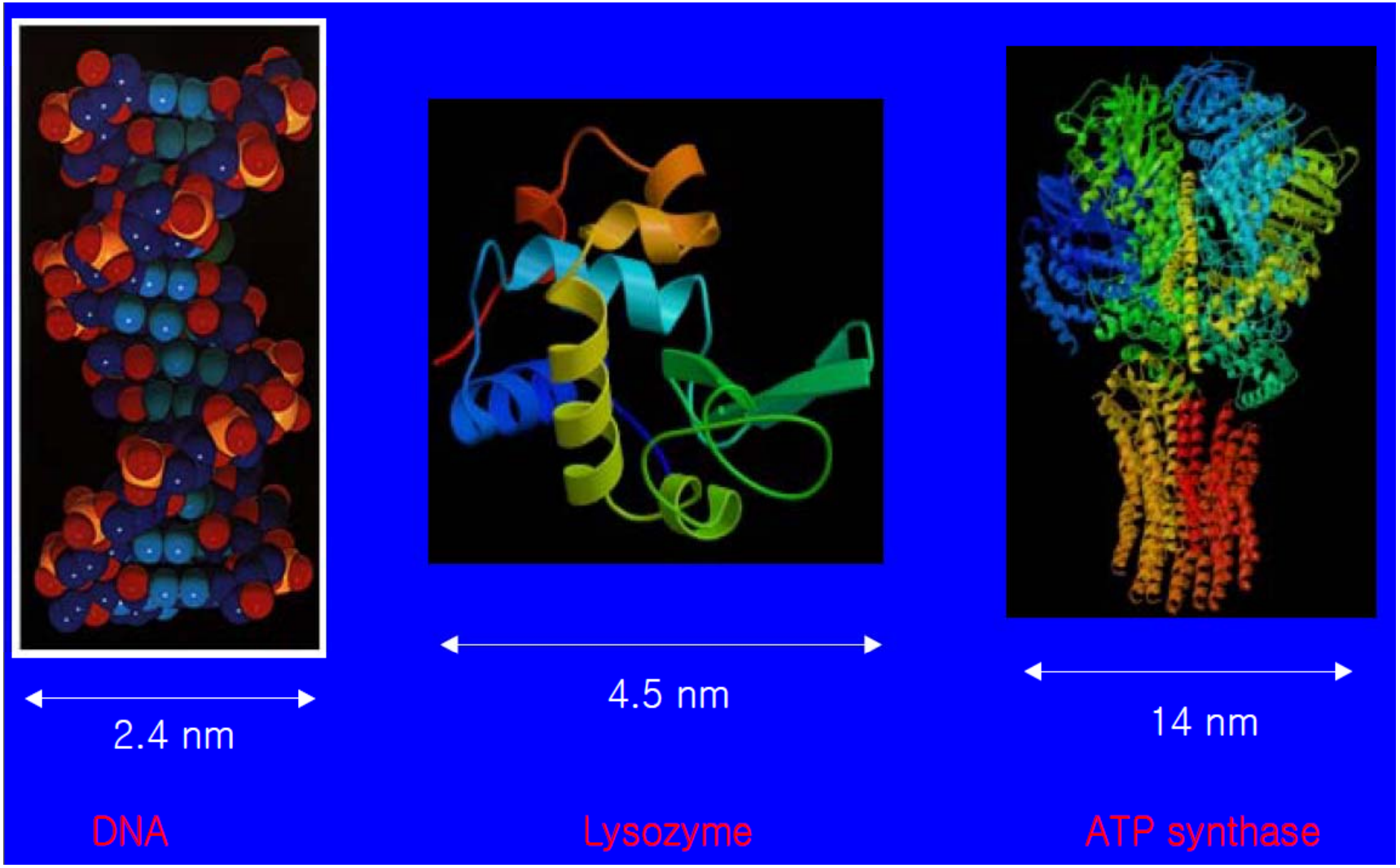
(Assistant of the US President for Science and Technology)



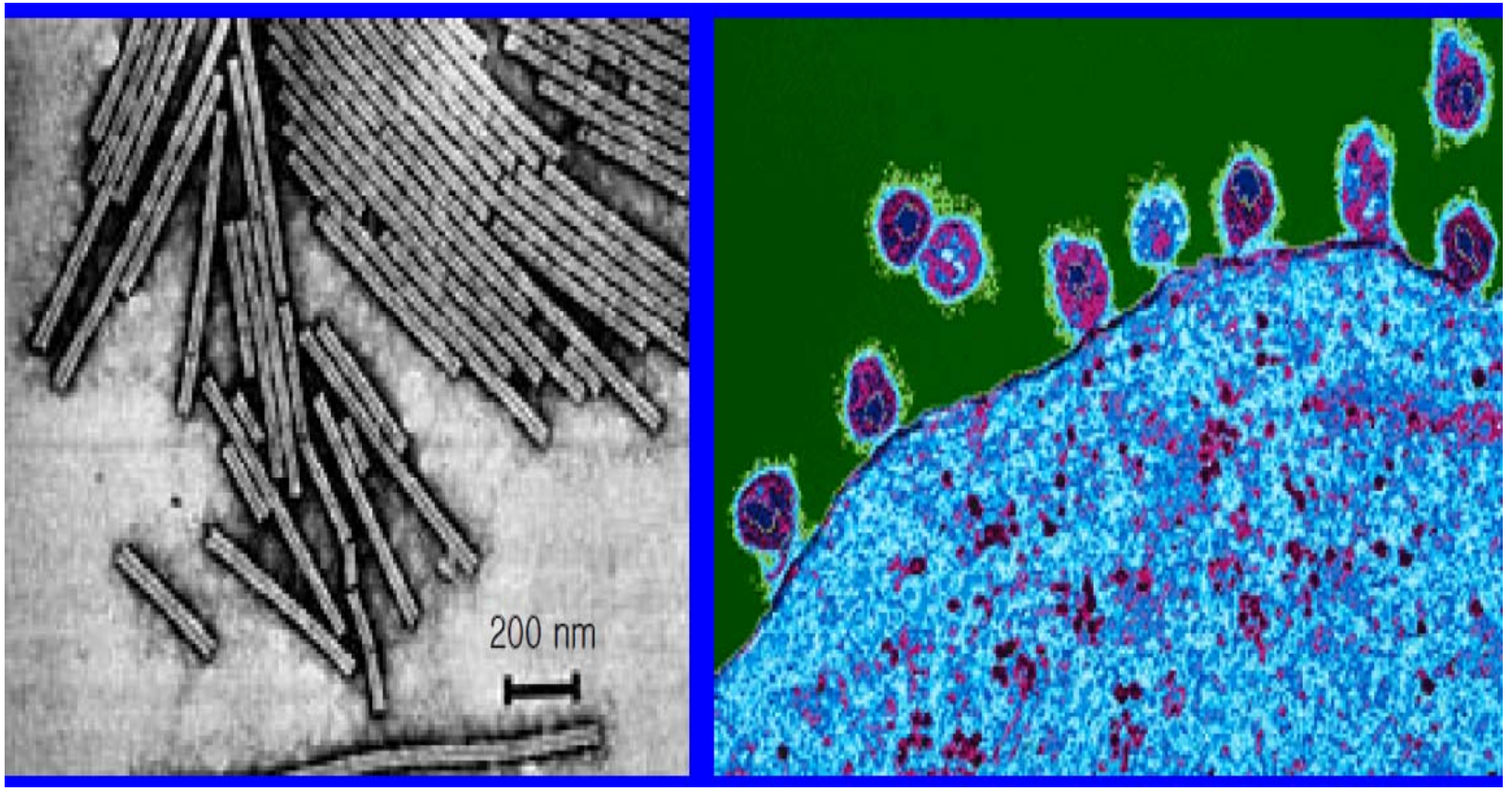
Length Scale Reaching



Bio-molecules of interest

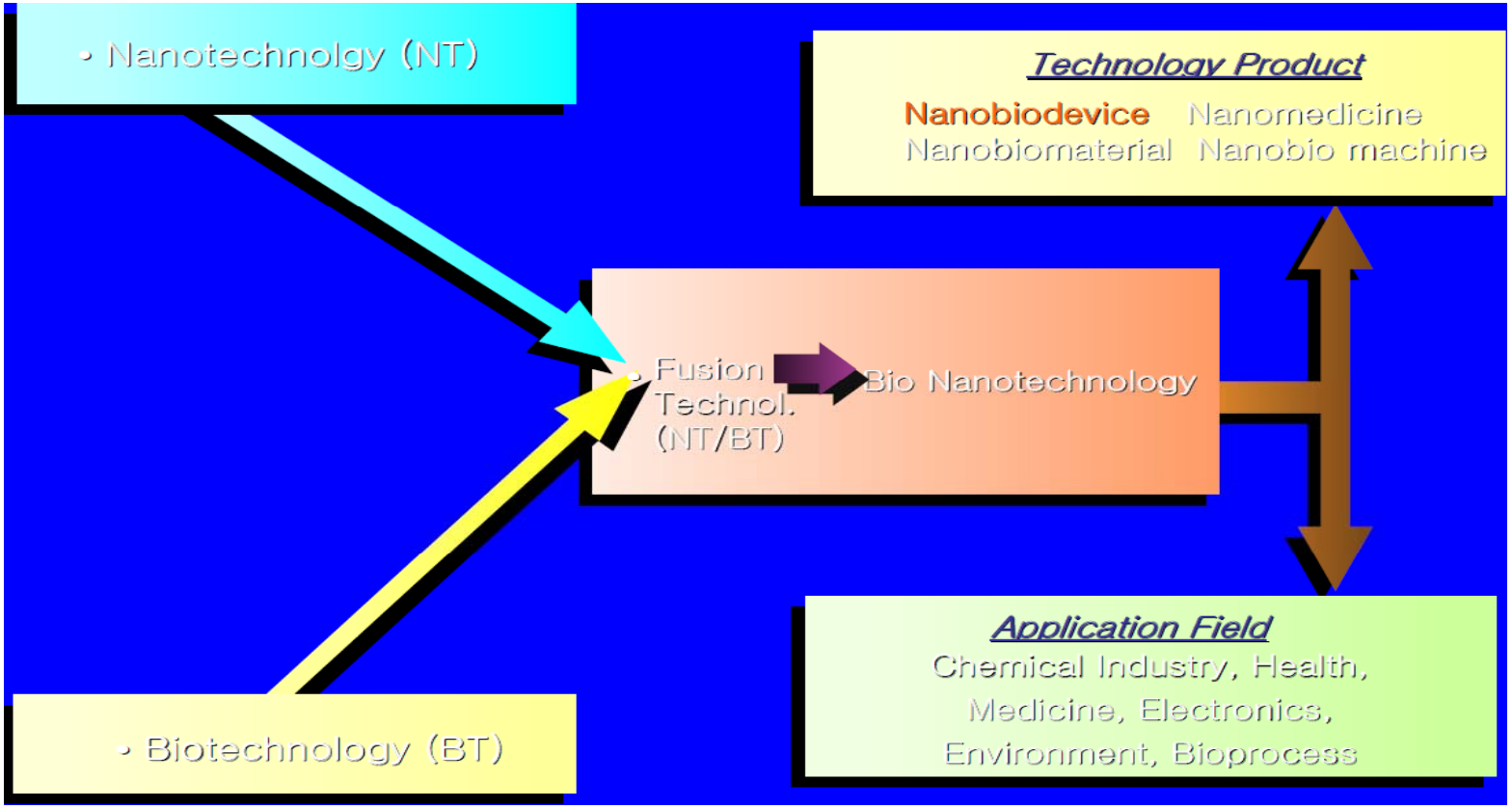


Virus in Action

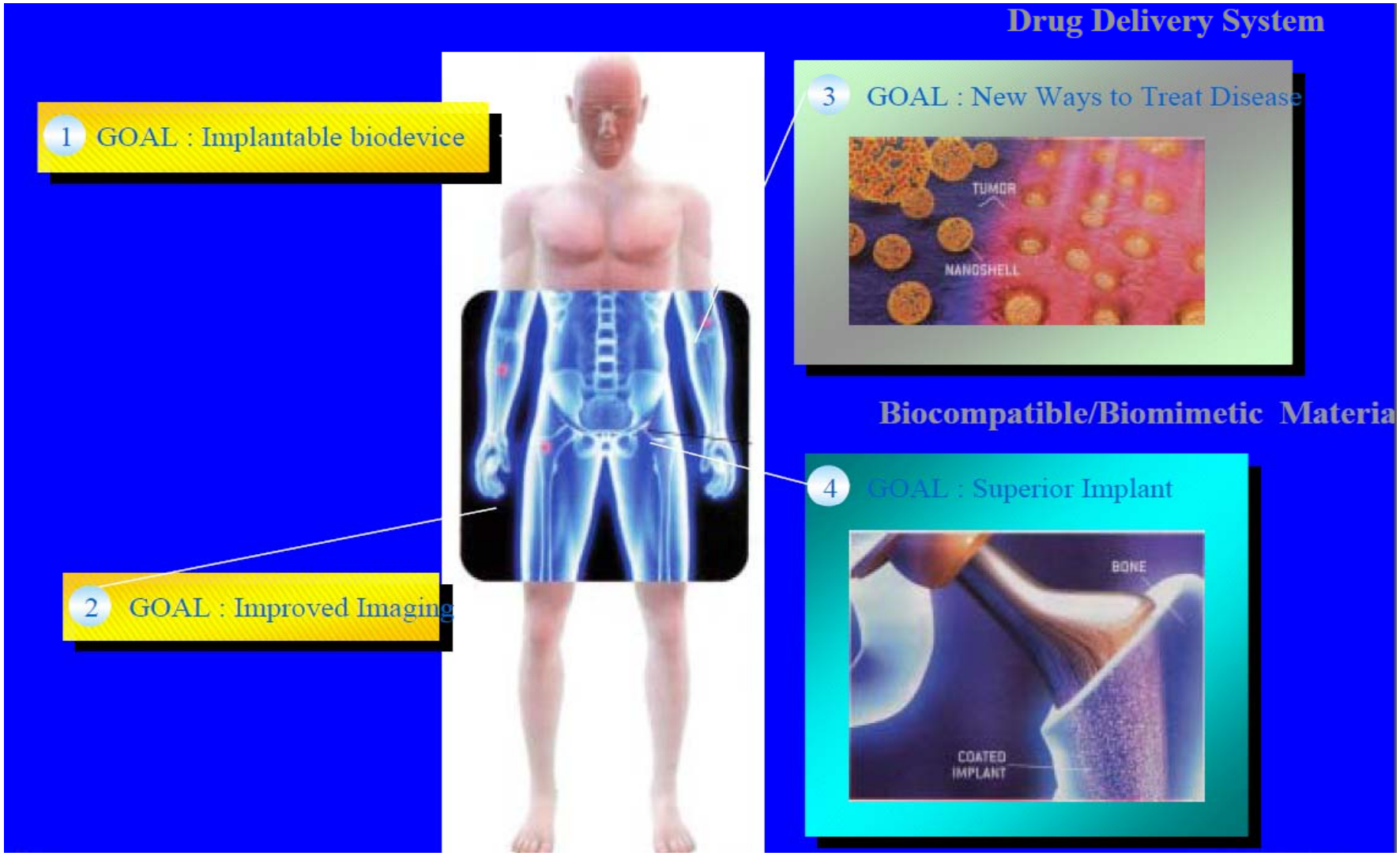


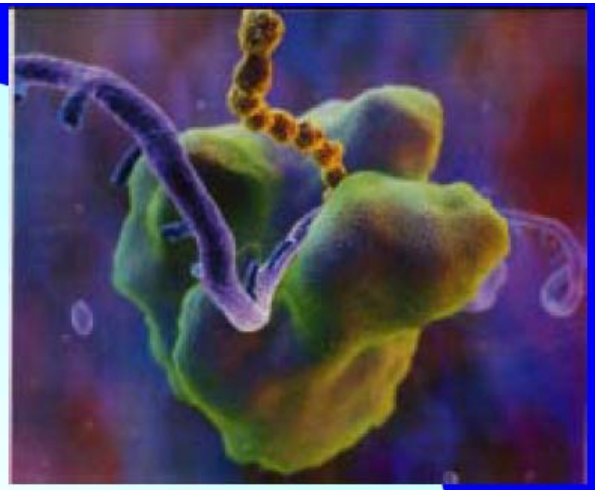
Nanobio technology

나노바이오 기술은 나노기술을 이용하여 바이오 시스템이나 나노바이오 융합 시스템을 나노스케일로 조절/측정하려는 기술이다.

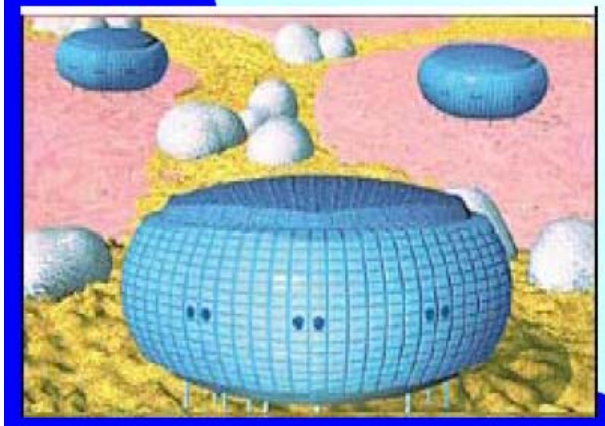


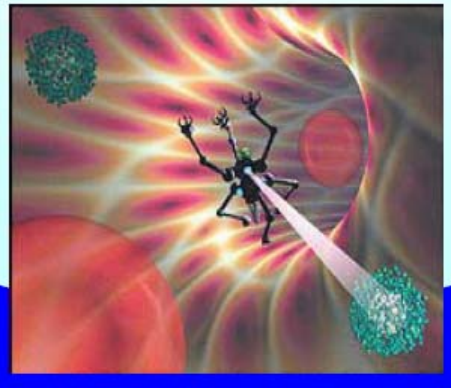
Nanomedicine

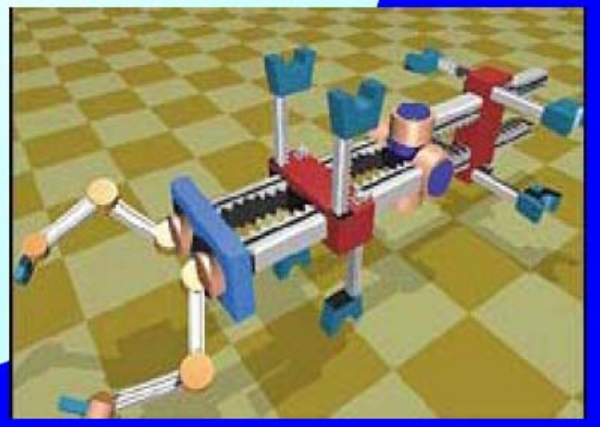




Nanomachine

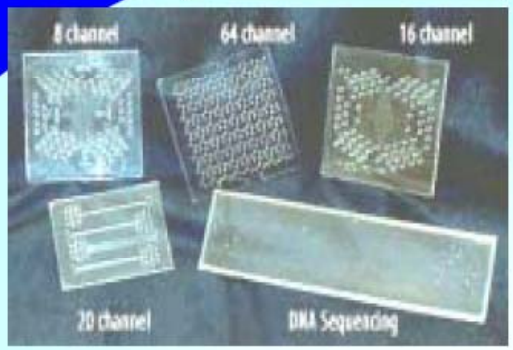




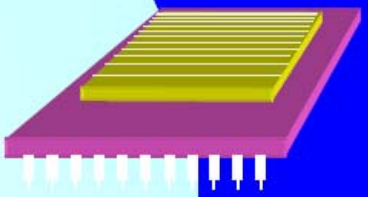



ANTIBODY
MAGNETIC NANOPARTICLES
DIRECTION OF MAGNETIZATION
ANTIBODY BOUND TO TARGET
QUANTUM DOTS
BEAD
MAGNETIC TAGS
NANO CODES
LATEX BEADS
BIO-NANOTECH IN ACTION
PROBE DNA
GOLD NANOPARTICLE
TARGET DNA
DNA FROM SAMPLE
PROBE DNA
BENT CANTILEVER

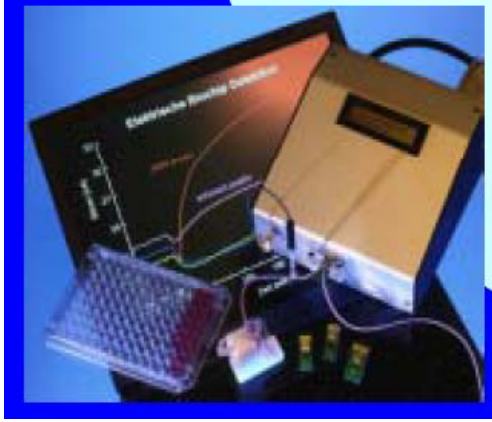
BIOSENSOR



Nanobiodevice

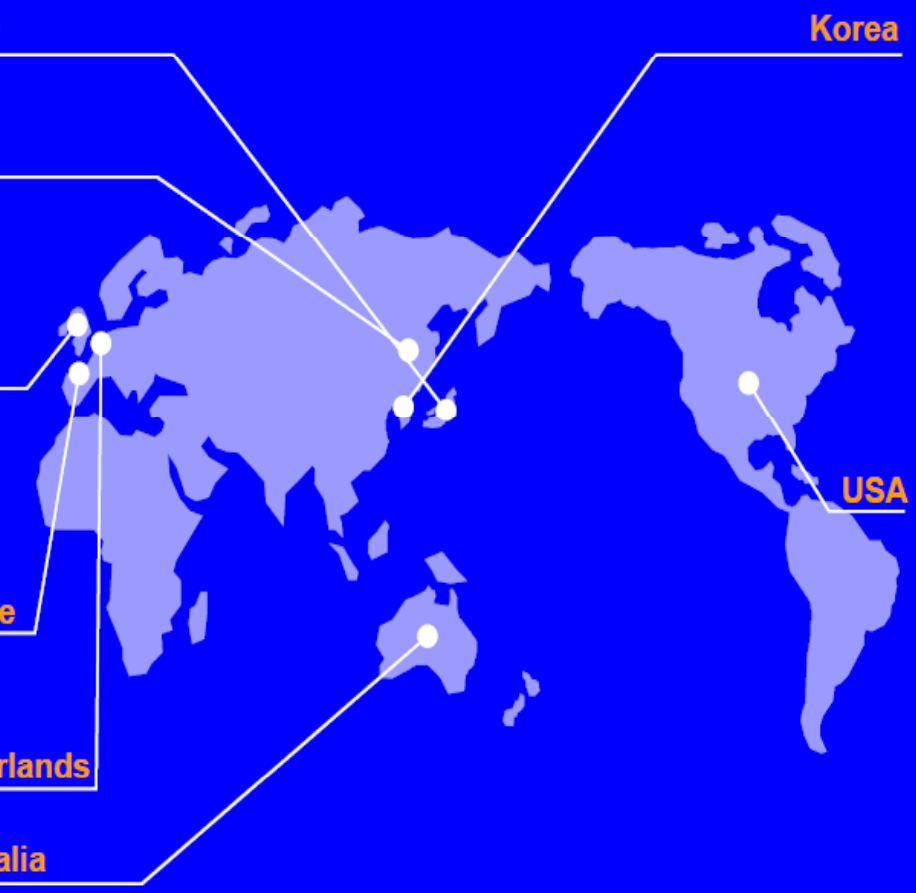


BIOCHIP



BIOELECRTRONIC DEVICE

Nanobiotechnology Center in the World



- JRCAT(MTTI)
- RIKEN

- Center for NanoScience & Nano (Chinese Academy of Sciences)

- IRC for Nanotechnology
- I^2 Nanotech Centre
- Institute of Nanotechnology

- CNRL
- Minatec Innovative Centre

- MESA+

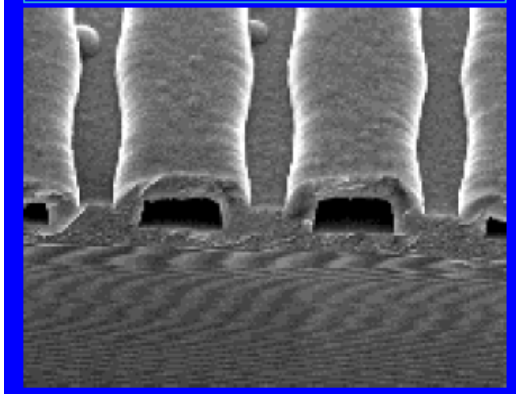
- CRC

- BioNanotechnology Center (POSTECH)
- Nano Bioelectronics & Systems Research Center(Seoul Natl. Univ.)
- Korea Institute of NanoBioTechnology (Pusan Natl. Univ.)

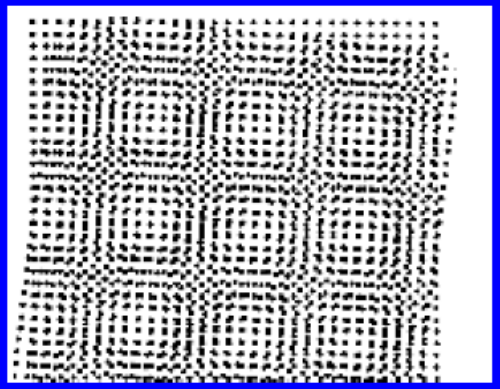
- NBTC(Conell Univ.)
- ASME Nanotechnology Institute
- Bindley Bioscience Center (Perdue Univ.)
- California NanoSystems Institute
- Center for Nano- and Molecular Science and Technology (Univ. of Texas-Austin)
- Center for Nanoscale Science & Technology(Rice University, Houston)
- Institute for NanoScience (Northwestern University)
- UC Berkeley Nano-Engineering
- Nanoscience Program (Univ. of Nevada, Reno)

Research Topics

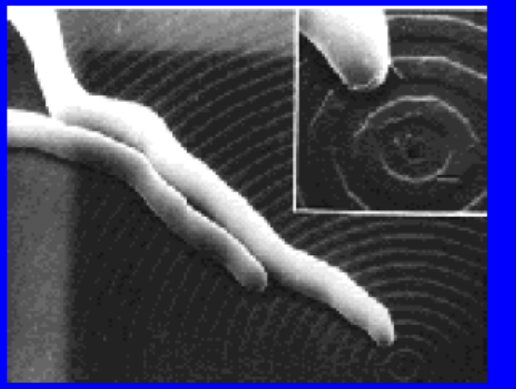
Microanalysis of Biomolecules



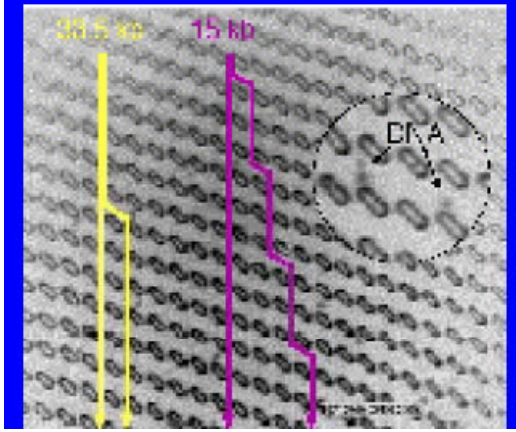
Molecular Templates



Bioselective Surfaces

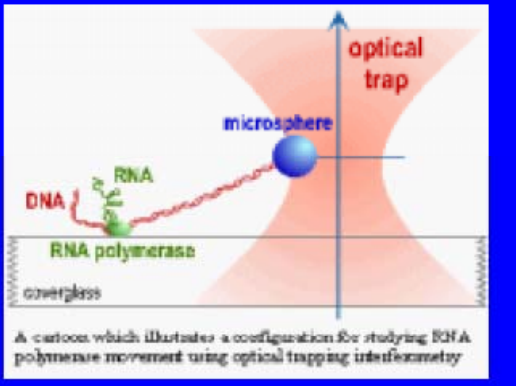


Selective Molecular Filtration



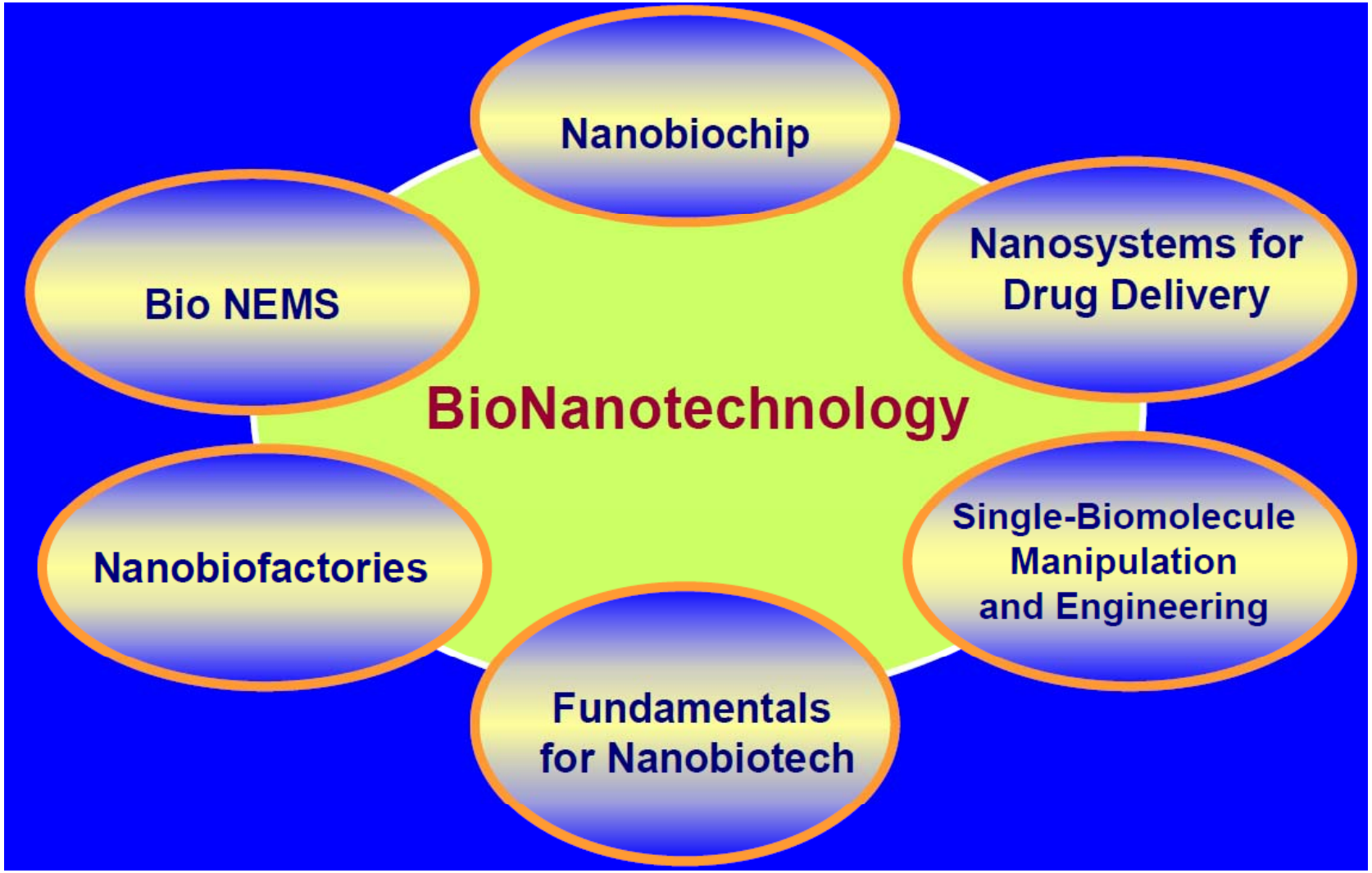
Sparse Cell Isolation

Molecular Motors



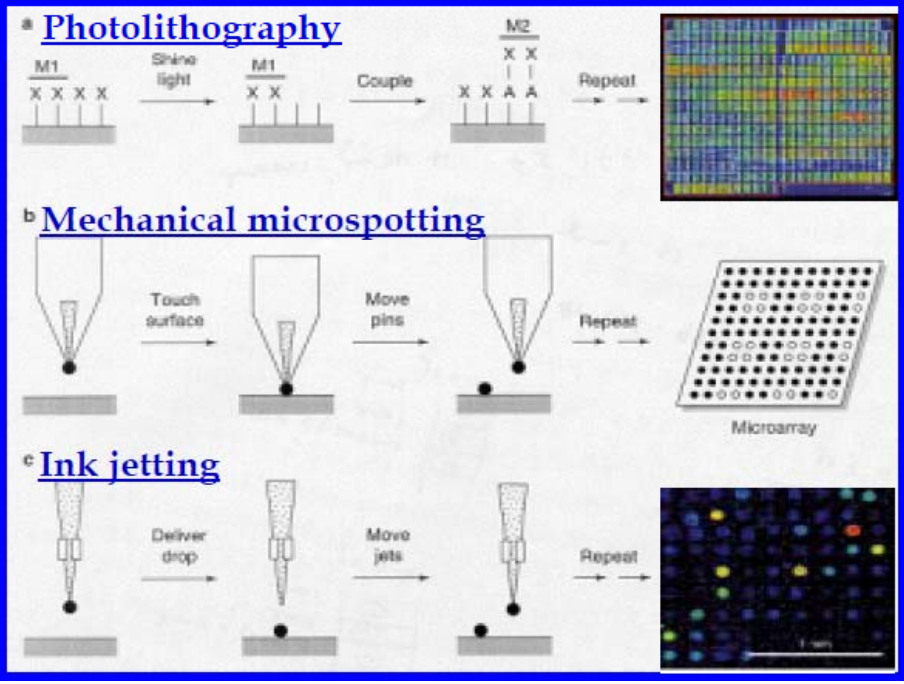
A cartoon which illustrates a configuration for studying RNA polymerase movement using optical trapping interferometry

Research Subjects

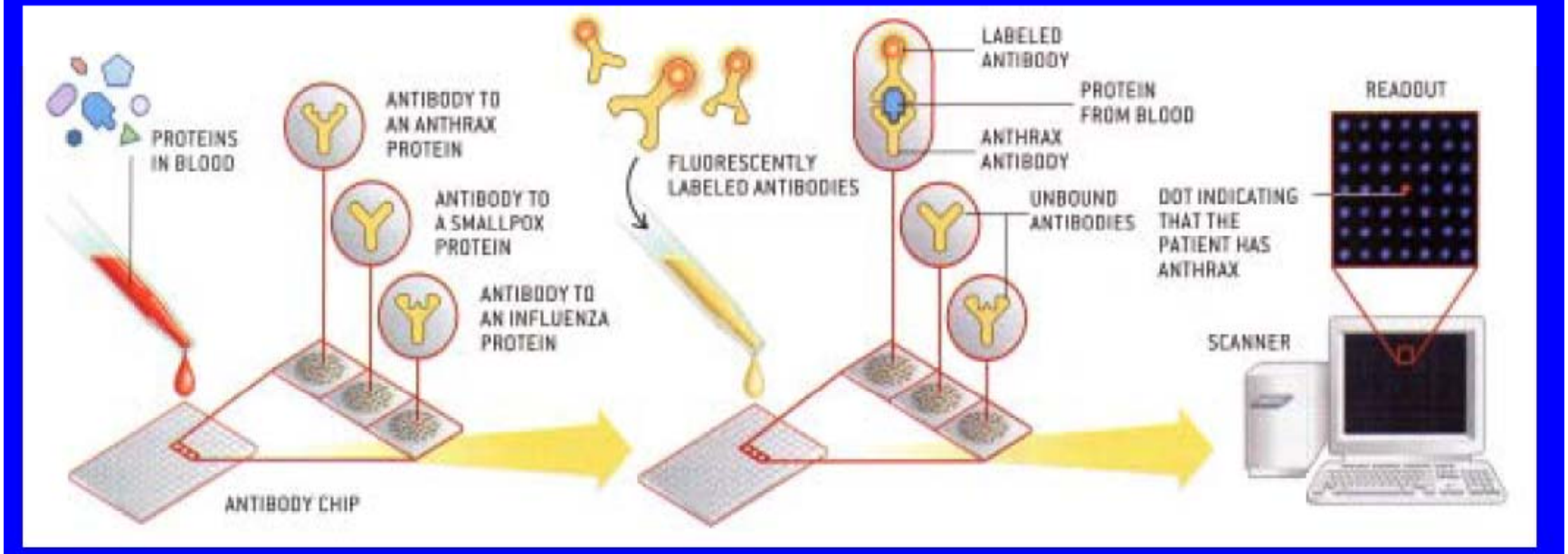


Nanobio chip – DNA chip

- **High-density arrays of oligodeoxynucleotides(ODNs) on a solid support**
- A set of ODN probes of defined sequence to search for complimentary sequences on a longer target DNA molecule
- **Advantages**: Parallelism, Multiplexing, Miniaturization, Automation
- **Applications**: Human Genome Project, Diagnosis of genetic disease, Environmental impact studies



Protein Array in Action

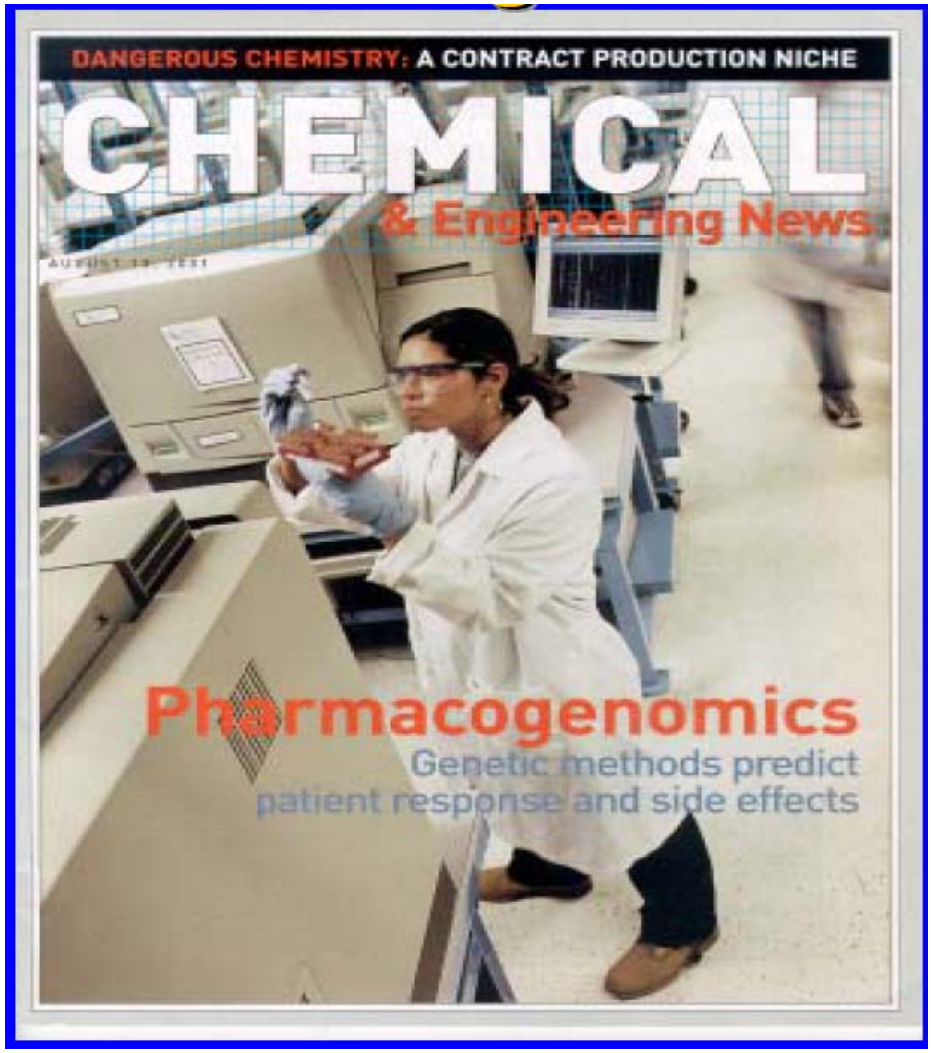


Purpose: Protein-Molecular Interaction

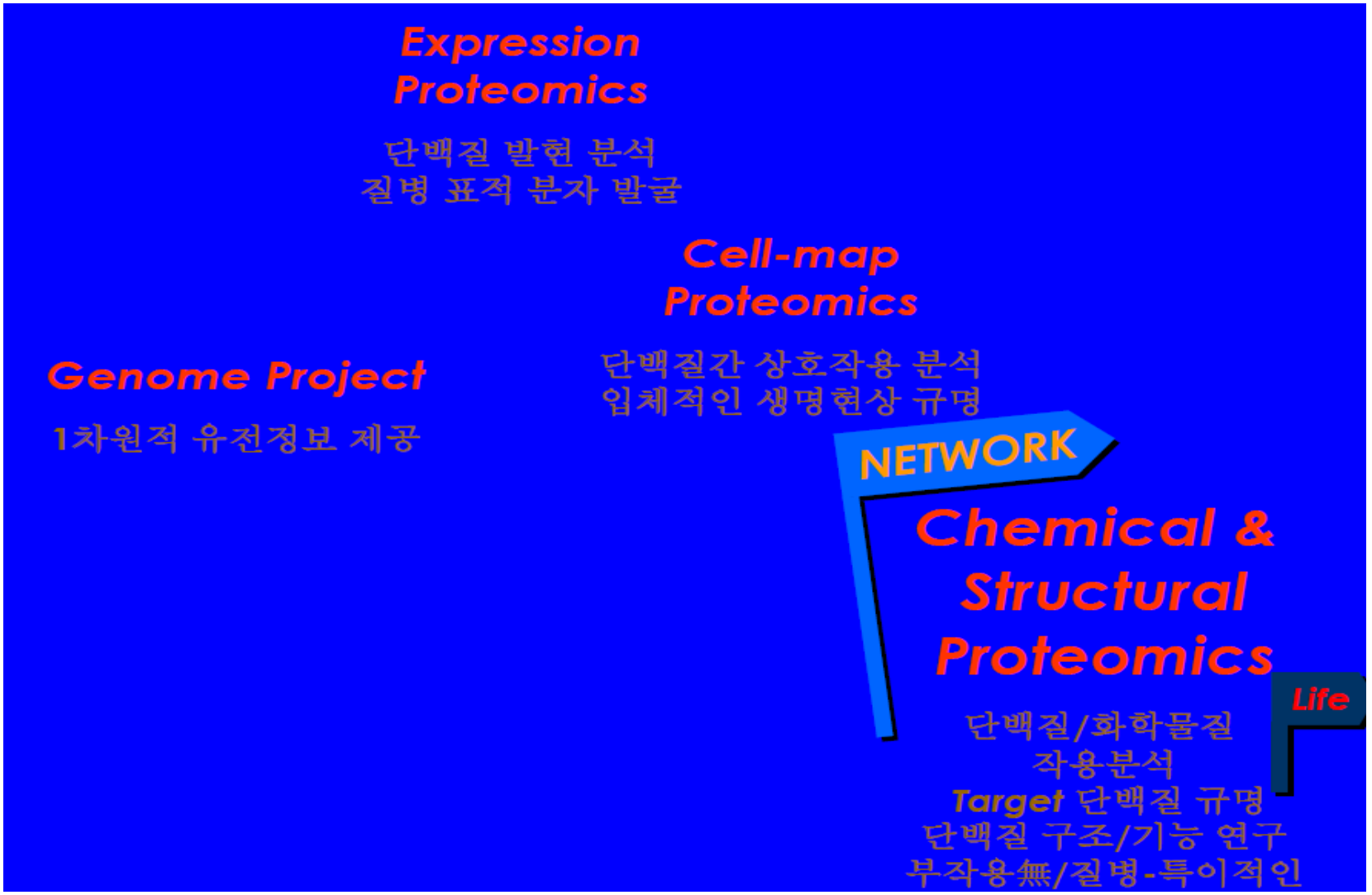
High Throughput Screening System for New Drug Diagnosis

Environmental Application

Pharmacogenomics



Dream Medicine

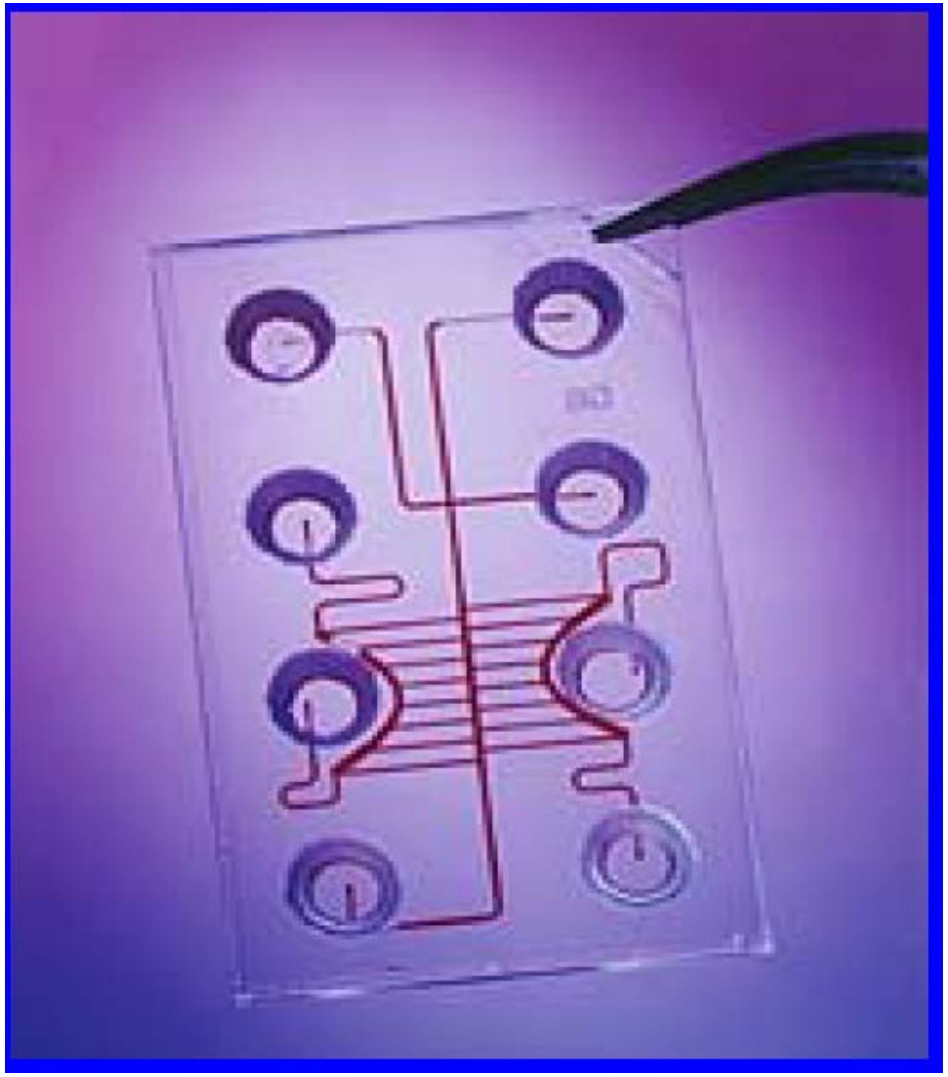


Microelectromechanical Systems (MEMS)

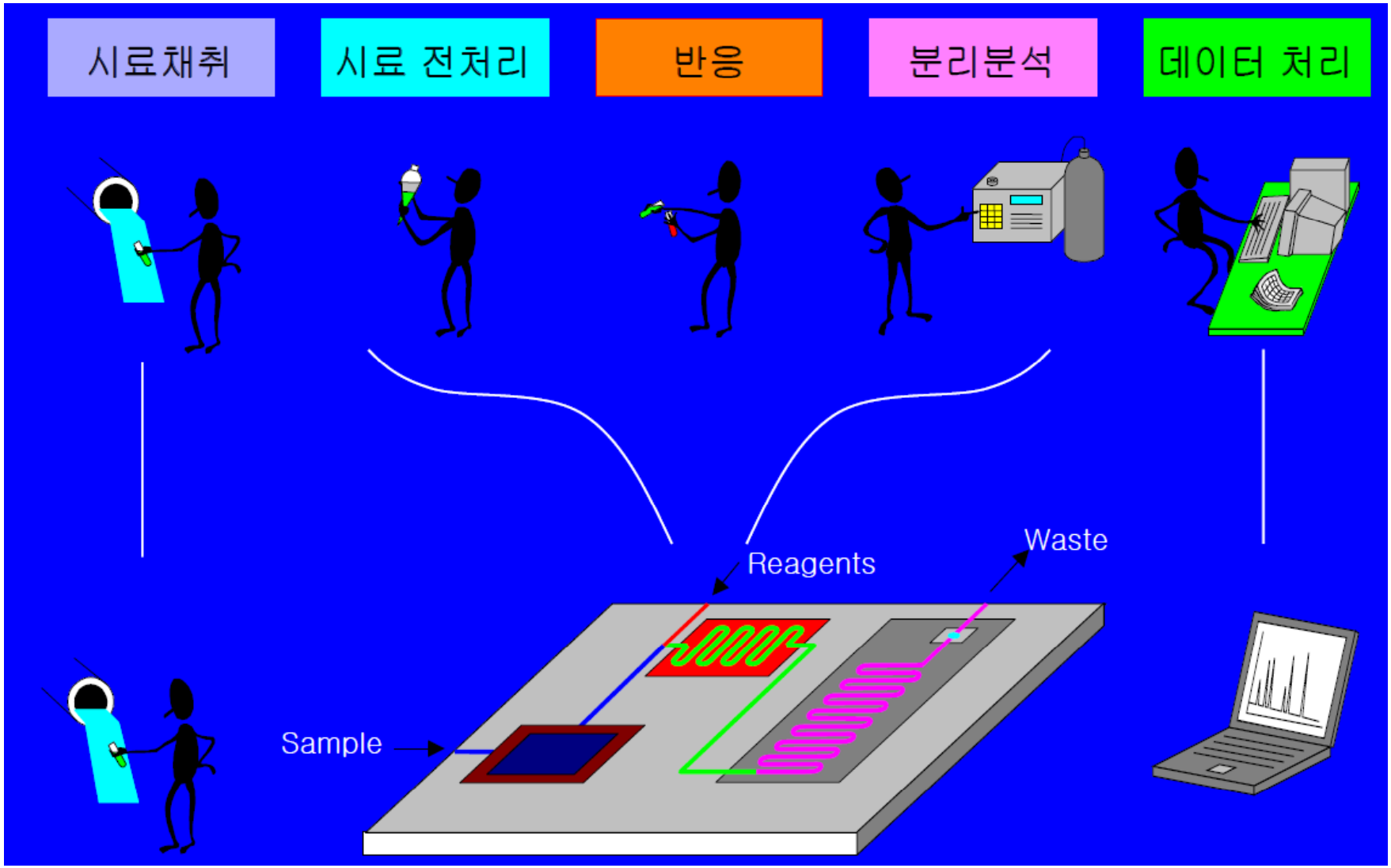
High speed stepping motor

A gear on an ant head

On-a-Chip



Chip processing



Chip의 활용분야

- 고속 신약 탐색
- 의료 진단, 건강 검진
- 식품, 의약품 안전성 평가
- 화학, 생물 공정 모니터링
- 환경오염물질 분석
- 소형 화학 공장

Nanosystems for Selective and Efficient Drug Delivery

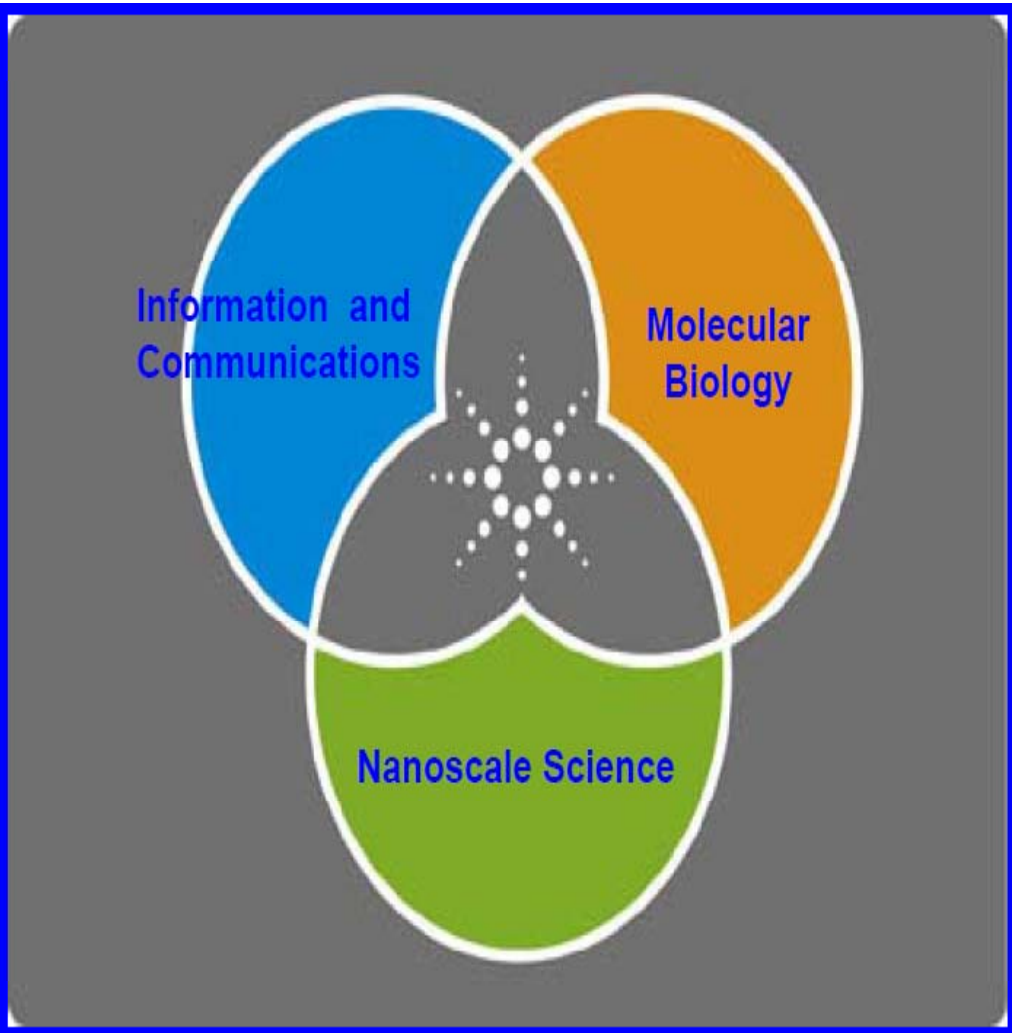
Key Trends

Concurrent revolutions

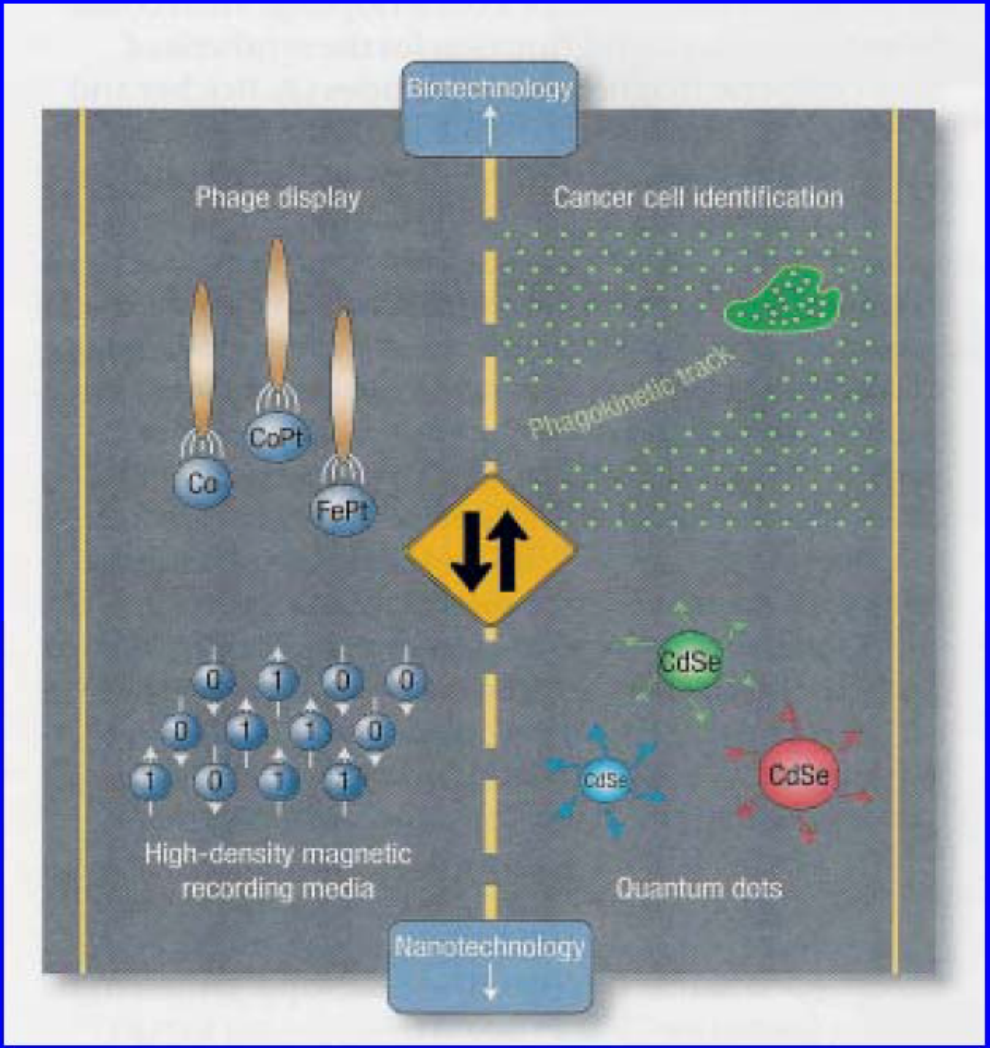
- Information and communications
- Molecular biology
- Nanoscale science

Anywhere, anytime

- Gigabit/sec communications
- Measurements
- Healthcare



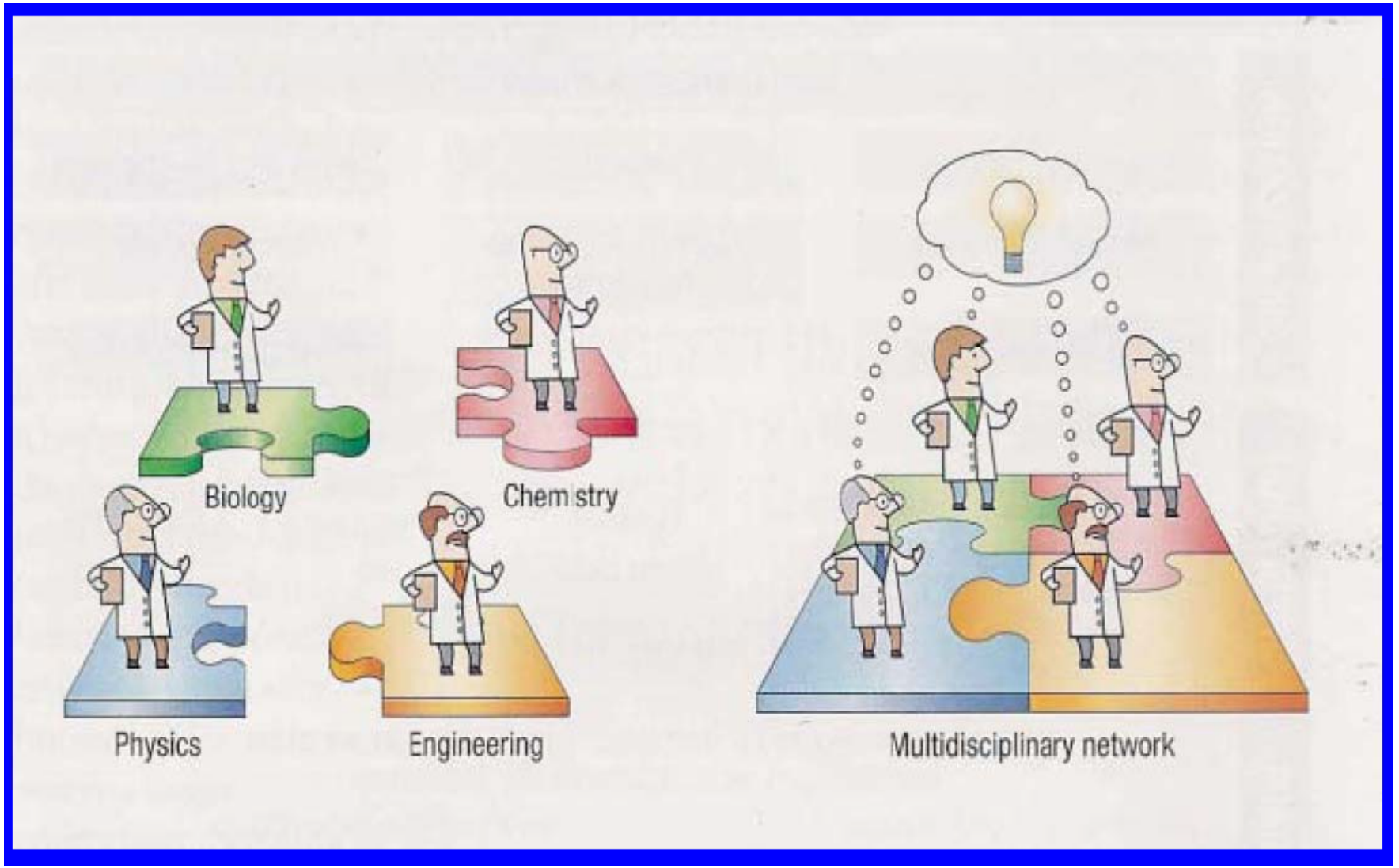
나노와 바이오는 상호 보완적



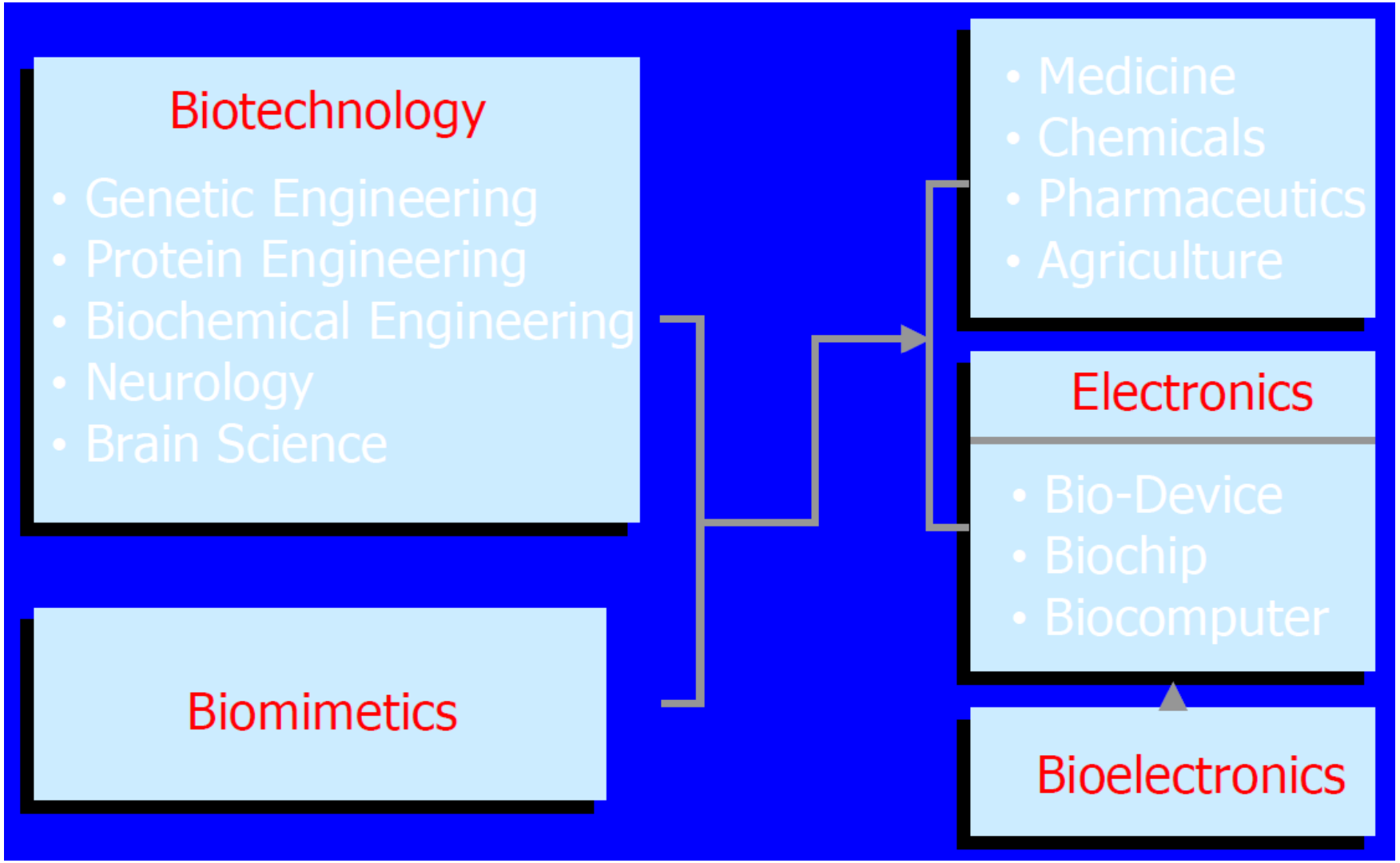
For example, materials science advances, such as quantum dots, can be used in biological assays to identify mobile cancer cells. Conversely, biologically selected peptides can be used to synthesize stable magnetic nanoparticles for applications such as high-density recording media. This flow of ideas and materials is set to continue for the foreseeable future.

Nature Materials, 2,73 (2003)

Multidisciplinary Network

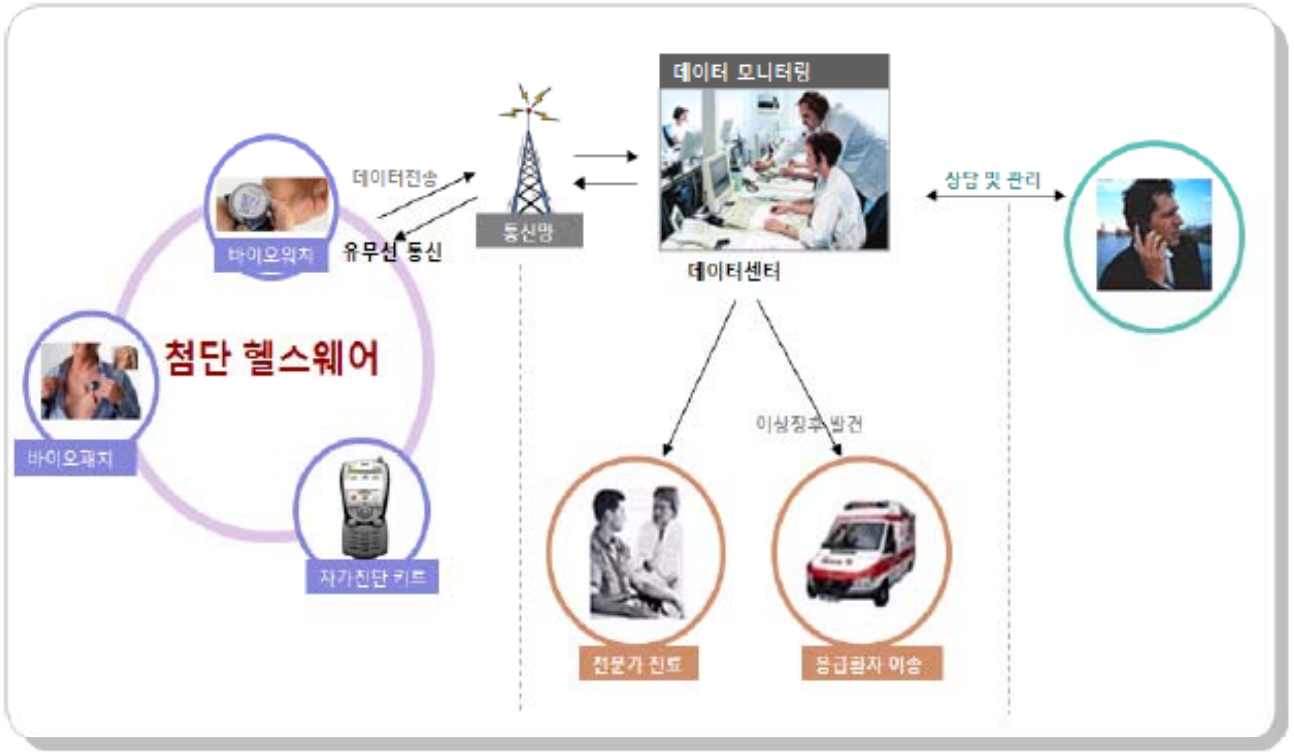


Biotechnology and Bioelectronics



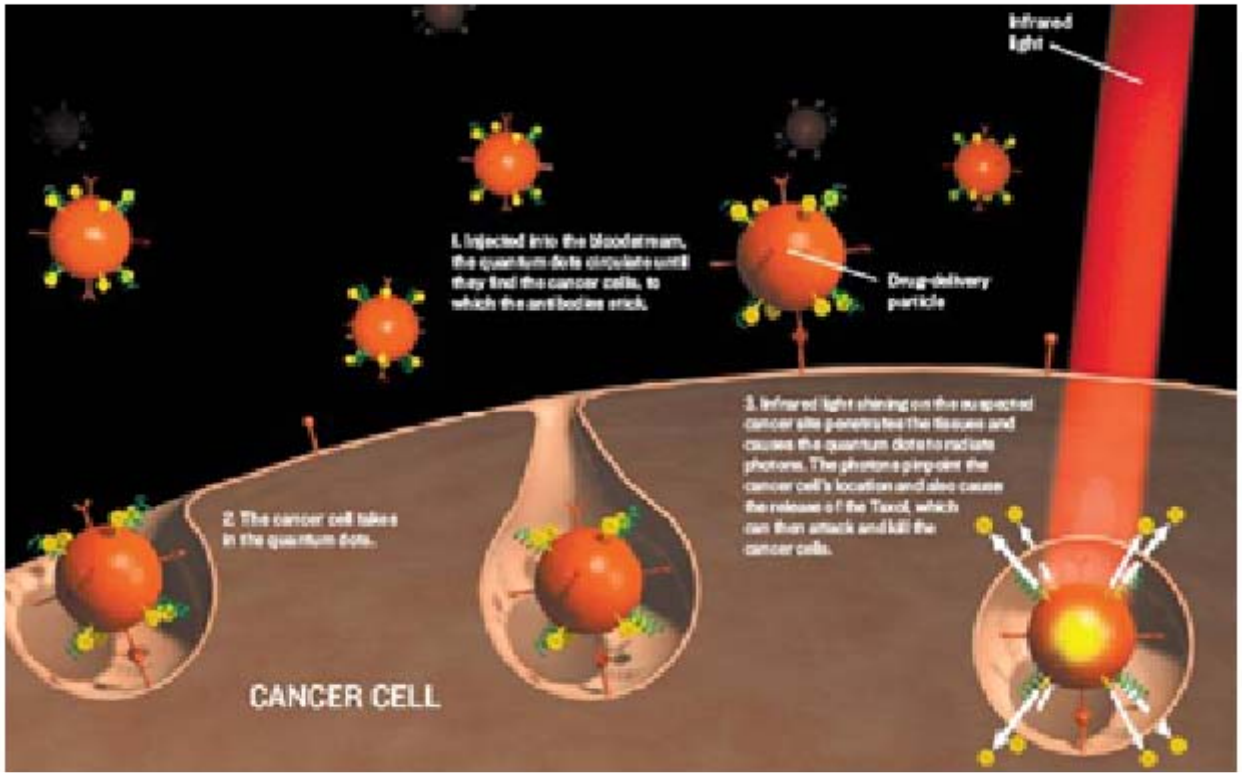
Biodiode – Biochip – Biomemory – Biocomputer – Biorobot

Applications of Nanobio technology



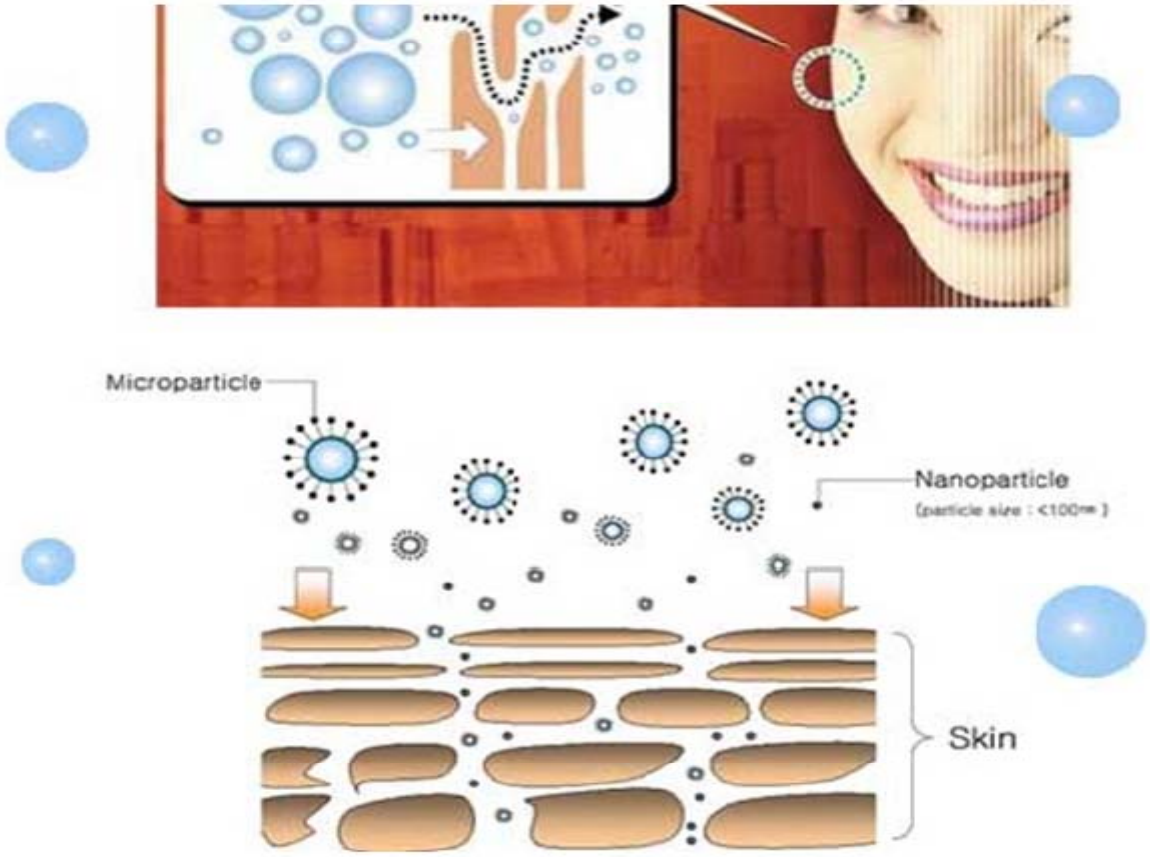
나노바이오 센서를 무선 네트워크에 연결해서 구현하고자 하는 유비쿼터스 헬쓰 모니터링 시스템

Applications of Nanobio technology



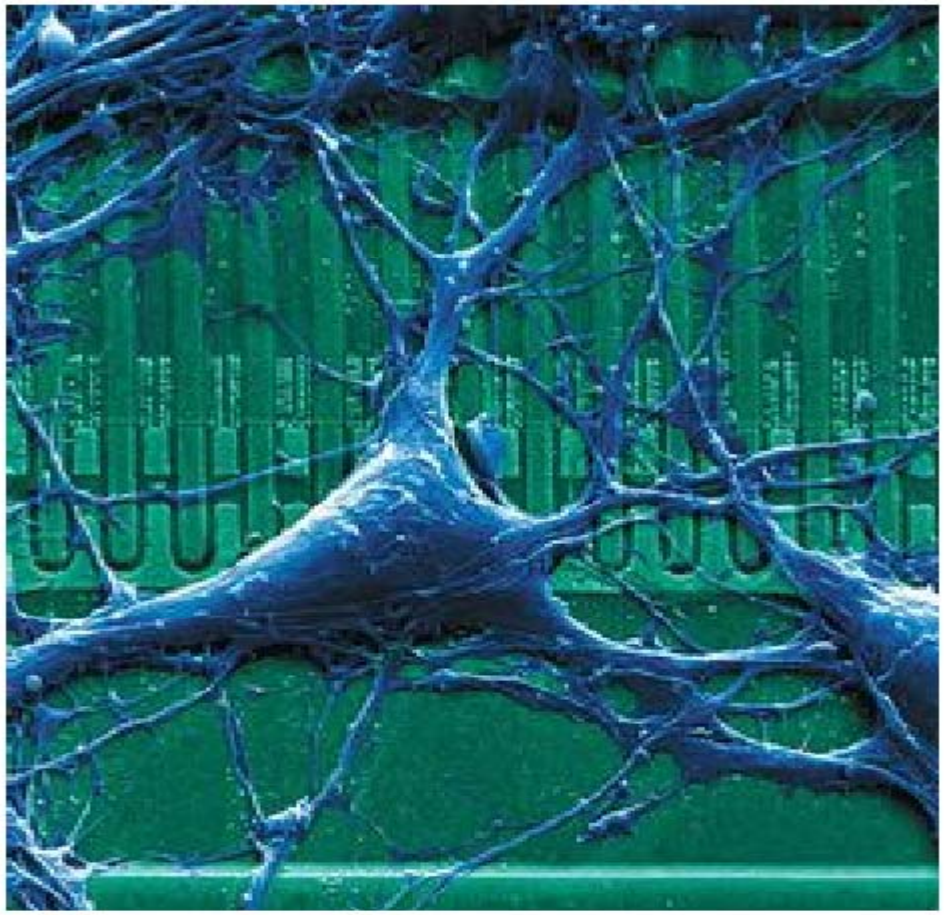
나노입자가 암세포에 결합한 후, 가지고 있던 암치료제를 방출

Applications of Nanobio technology



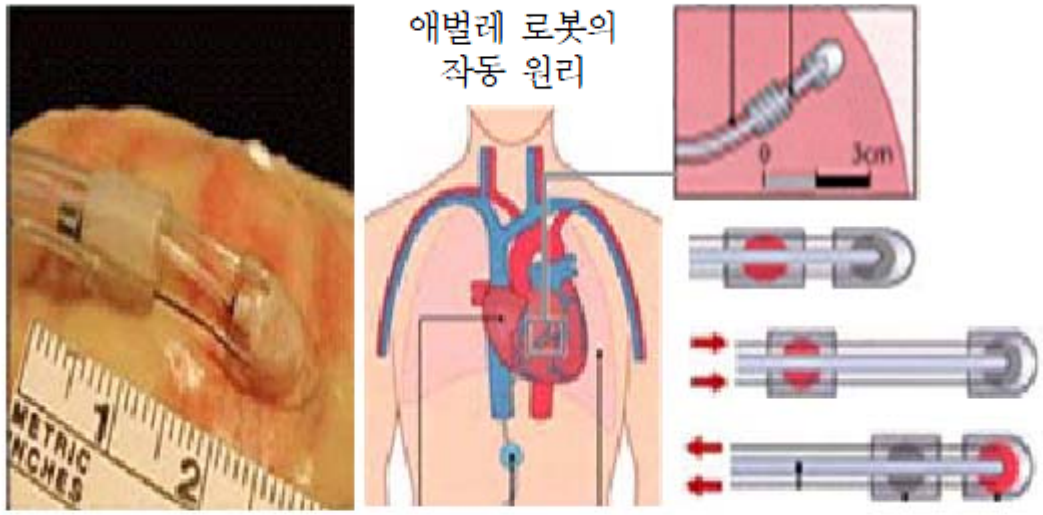
화장품 물질을 피부 간격보다 작게 만들어서 쉽게 피부에 흡수

Applications of Nanobio technology



신경세포의 신호를 읽는 바이오 칩

Applications of Nanobio technology



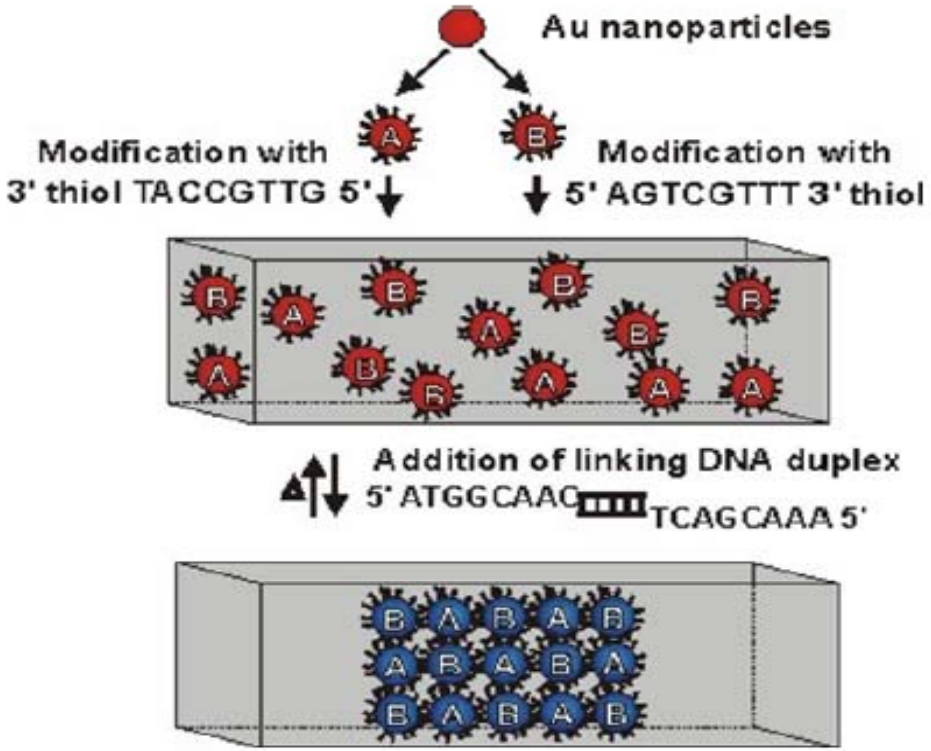
카네기멜론 대학의 애벌레 로봇

Applications of Nanobio technology

- 나노바이오 센서

- 나노바이오 로봇

Applications of Nanobio technology



특정 염기서열의 DNA가 코팅된 금 나노입자를 이용한 DNA 검지 기술의 : 타겟 DNA가 나노입자 표면의 DNA와 결합하여 나노입자를 큰 덩어리로 만들면 용액의 색이 변하는 원리를 이용한 검지.

Questions ?