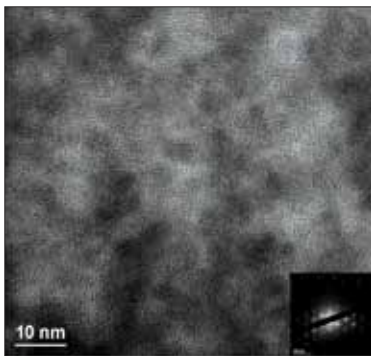




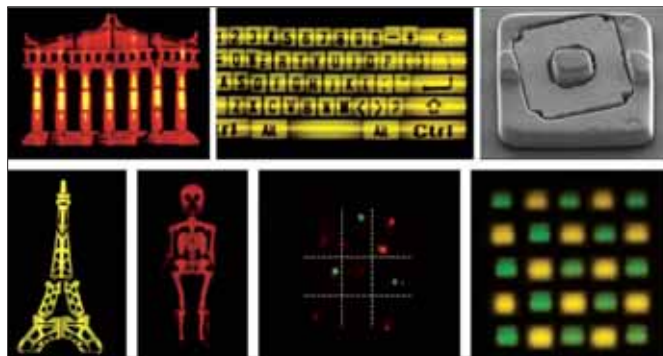
# NANO Systems Institute National Core Research Center

## Achievements & Vision

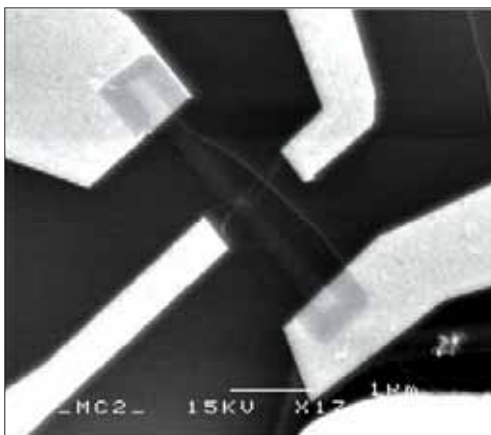
- » NSI-NCRC (NANO Systems Institute-National Core Research Center) supported by the KOSEF (Korea Science & Engineering Foundation) and MEST (Ministry of Education, Science & Technology) has been launched at Seoul National University with SAIT (Samsung Advanced Institute of Technology) and KIST (Korea Institute of Science & Technology) as active participants.
- » The principal objectives of the NSI-NCRC are to realize nano application system based on nanotechnologies combined with scientific principles developed in various departments at SNU and also to deploy them to active member companies.
- » In addition, the interdisciplinary graduate program in nanoscience and nanotechnology has been initiated as an education part of the NSI-NCRC activities.



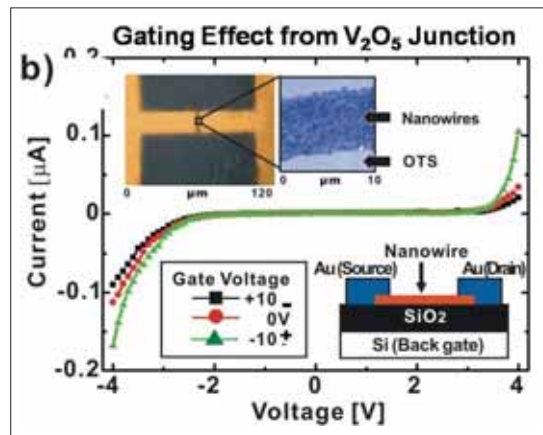
Prof. Nong-Moon Hwang, Journal of Crystal Growth, 2008



Prof. Sunghoon Kwon, Nature Materials, 2008



Prof. Yungwoo Park, Nano Letters, 2007



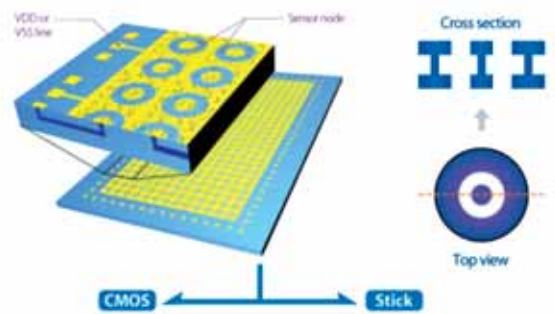
Prof. Seunghun Hong, Journal of Nanotechnology, 2007

# Nano Systems

## C-Chip for Ubiquitous Sensor Platform

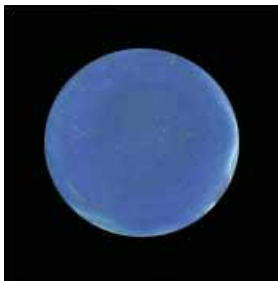
The C-Chip platform is composed of the NSI's proprietary technology to combine silicon chip with nano material such as CNT films. Variety of CNT treatment leads to different sensor applications suited for Ubiquitous environment.

C-Chip platform can be used to various bio and chemical sensing applications such as lab on a chip, liquid & gas sensor, bio molecule detector, gas monitoring system, and bacteria virus real time detector



## LEDs with Photonic Crystal Phosphor

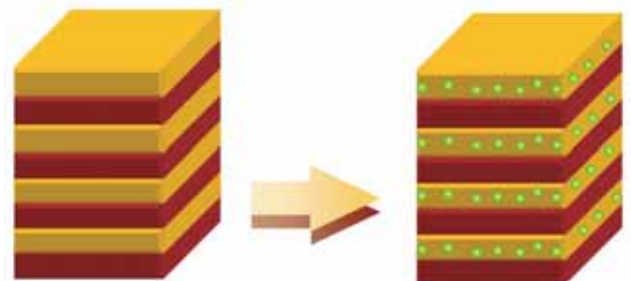
Nano Photonic Crystal system is applied to the quantum dot system to effectively convert and filter the light source, which can be used as the LED as well as other optical devices and systems. The results may have significant impact on various photonic devices and systems, especially on the GaN-based white LEDs.



PS-PI film after blending



TEM of a blended film



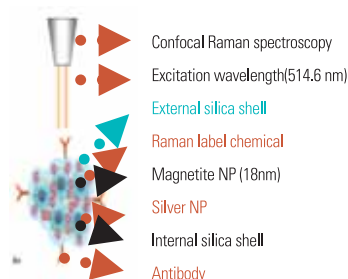
TEM of a blended film

## Magnetic SERSDOT Nano-Tagging Technology

Magnetic Surface Enhanced Raman Spectroscopic Nano-Tagging Materials, so called "M-SERS Dots" have dual properties; SERS and magnetic properties in a silica-based nanoparticle (NP). They are powerful tools for the separation and the multiplex detecting of the disease-related biomarkers or various biological events.

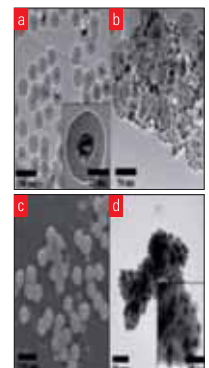
- Easy to prepare.
- Compatible with bio system.
- Easy to separate from biological samples.

### Concept of M-SERS Dots



Magnetic and SERS active NP

### TEM and SEM images

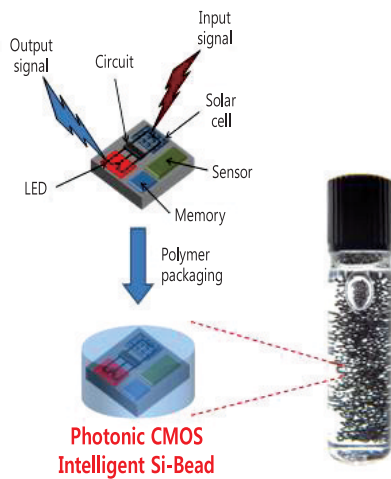


# Newly Incubated Projects

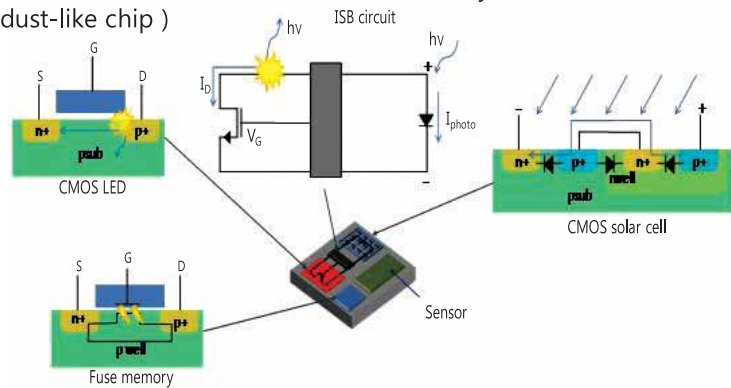
## Photonic CMOS based Intelligent Silicon Bead (ISB) System IC 2010 Project supported by the Ministry of Knowledge Economy

New type of fundamental technology different from conventional paradigm of CMOS SoC

- CMOS devices using optical input and output including power supply
- Intelligent Silicon Bead (ISB) with optical communication part and memory part is a dust-like device 100 times smaller than conventional device including packaging, allowing mass production
- Apply ISB to various bioassay experiments and allow to open new disposable semiconductor market



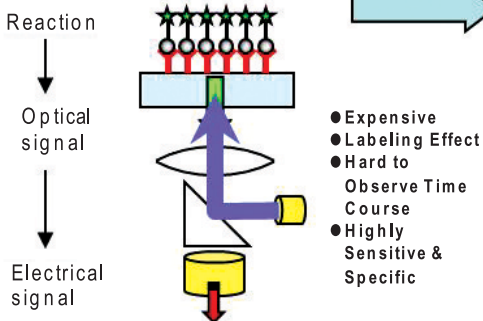
### Part 1: Fabrication of photonic CMOS Intelligent Silicon Bead (ISB) • ISB structure = LED + Solar cell + memory + sensor (<math>\ll 1\text{mm}</math>, dust-like chip)



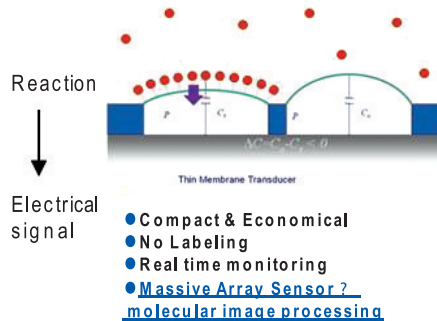
## CMIPs : CMOS Molecular Image Processors supported by the Ministry of Education, Science and Technology

- On-chip biosensing with direct electrical detection and signal processing
- Nano Membrane Transducer (NMT) for limit of detection challenging that of optical sensing
- Massive sensor array (128x128) for DNA microarray type detection enabled by CMOS integration
- Diagnosis of degenerative diseases

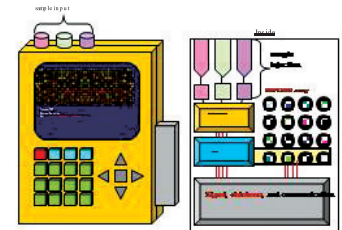
### Optical Imaging



### Electrical Imaging



### Chip-scale DNA Microarray



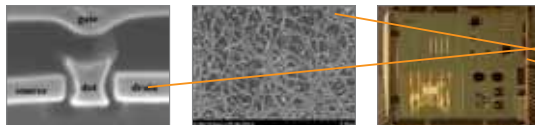
# Achievements & Vision

Based on the achievements in the last 4 years, NSI is working on the three important application areas including the **C Chip system**, ubiquitous sensor platform embedded in CMOS chip, **Energy devices** based on the Nano Photonic Crystal, CNT, and low temperature Nano Crystal Silicon System, and **Bio-medical devices** based on SERSDOT and the non-destructive single molecule detection system.

We are open for all collaborations with both domestic and foreign partners, and ready to share our IP's and technology platforms for accelerated advance in our mission.

## Phase 1

1-1



1-2



2-1



2-2



2-3



## Phase 2

### Nano Electronics

- U electronics
- C ROBOT

### Nano Energy

- LED
- Solar Cell

### Nano Bio

- PgrammableAAO
- HTS
- Noninvasive cell probing

**Phase 1** : 4 years (2003-2007) achievements under the NCRC program in each area including nano electronics, bio, and optical application

**Phase 2** : 3 years (2008-2010) program has been established to realize the nano systems based on the achievements made in the phase 1.



### Key Contacts

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