

The National Science and Technology Program on Nanoscience and Nanotechnology

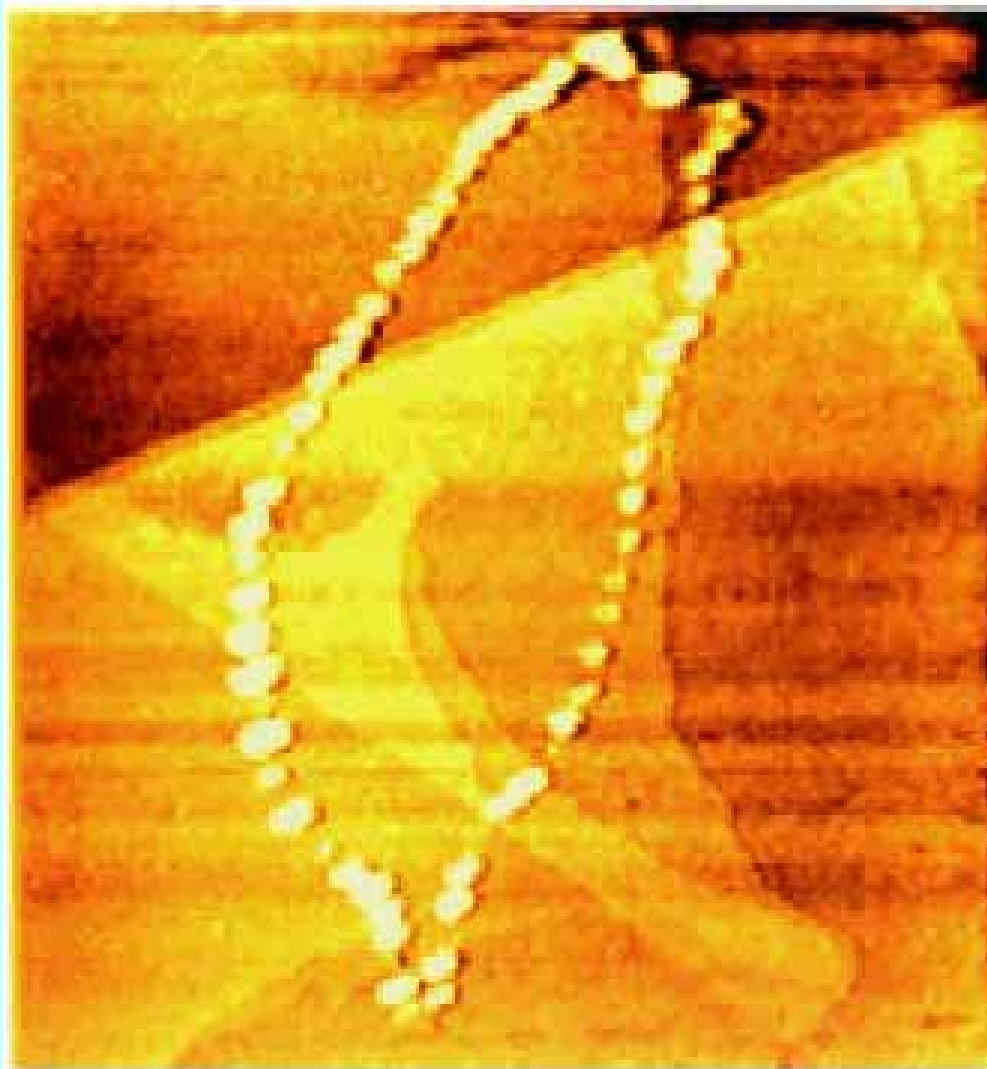
M. K. Wu

**Director, Institute of Physics, Academia Sinica
and**

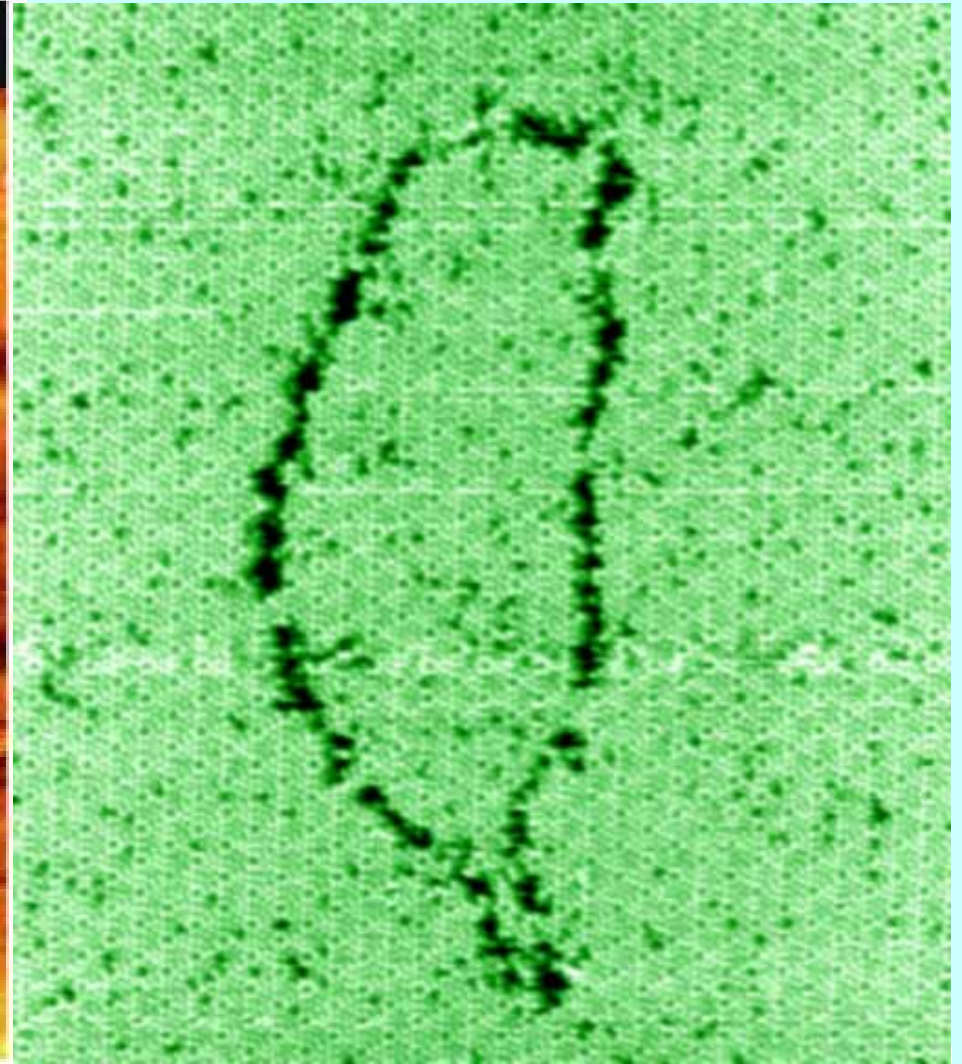
**Executive Director (Academic Division)
National Nanotechnology Program**

IUMRS-ICAM-A10 Yokohama, Japan Oct. 12, 2003

Nanotechnology will lead Golden Taiwan to Green Silicon Island



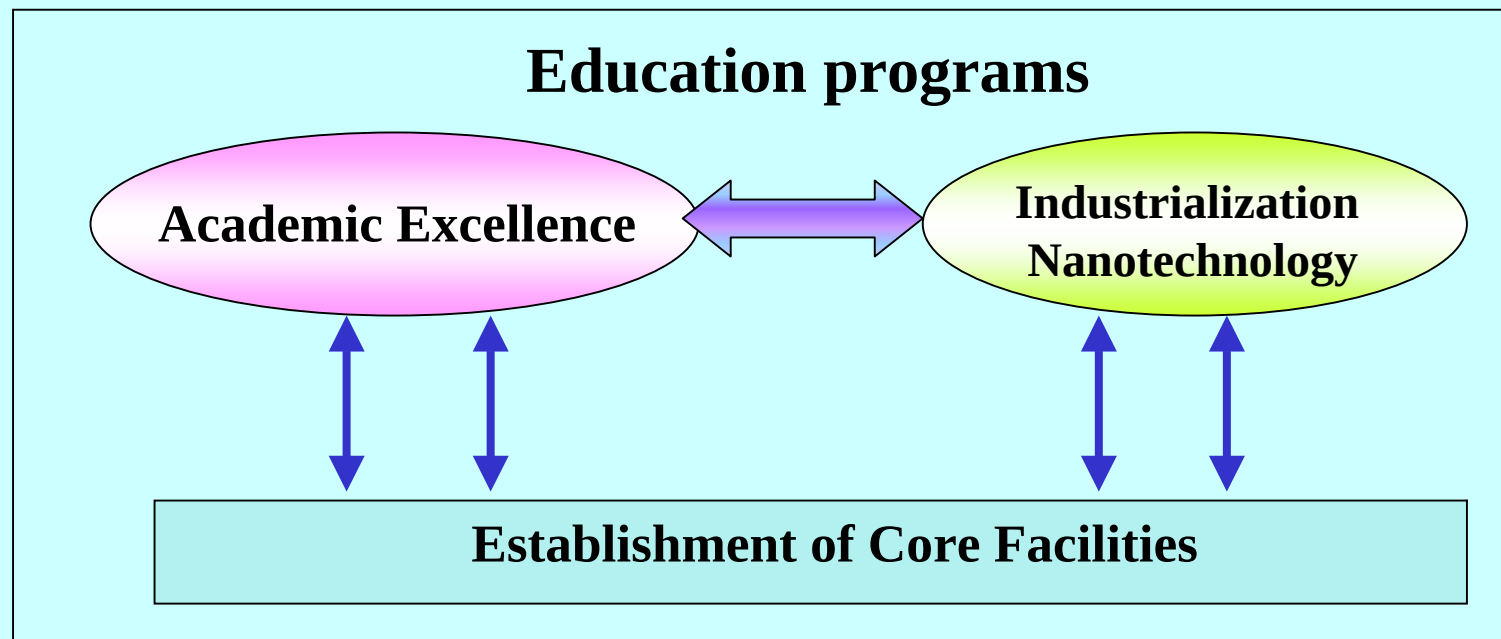
— 1000 Å



— 100 Å

National Program on Nanoscience and Technology

- Through the establishment of common core facilities and education programs to achieve academic excellence, and promote industrial applications
- Based on the national competitive technologies to bring up the academic excellency, and then create innovative industrial applications



Budget 2003-2008

(Unit: NTD\$1000)

	FY92(2003)	FY93 (04)	FY94 (05)	FY95 (06)	FY96 (07)	FY97 (08)	Total
Academic Excellence	636,500	738,000	738,000	868,000	868,000	951,000	4,899,500
Industrial Applications	1,564,993	1,969,173	2,295,000	2,565,000	2,780,000	2,857,790	14,081,956
Core Facilities	428,300	685,520	748,584	527,776	515,776	662,986	3,768,942
Educations	45,000	50,000	50,000	50,000	50,000	50,000	295,000
Project Office	18,000	18,000	18,000	18,000	18,000	18,000	108,000
Total	2,692,793	3,460,693	3,849,584	4,028,776	4,231,776	4,539,776	22,803,398
MOEA(Technical Division)	1,800,000	2,275,000	2,525,000	2,635,000	2,830,000	3,028,000	15,193,000
MOEA(Industrial Bureau)	22,993	25,173	70,000	100,000	120,000	144,000	482,166
MOEA (Energy Commission)	30,000	40,000	40,000	40,000	40,000	40,000	230,000
MOEA(Bureau of Standard)	48,300	155,520	168,584	157,776	145,776	142,776	918,732
National Science Council	380,000	500,000	530,000	580,000	580,000	638,000	3,258,000
MOE	295,000	250,000	250,000	250,000	250,000	275,000	1,570,000
Atomic Energy Council	12,000	9,000	60,000	60,000	60,000	66,000	267,000
Academia Sinica	80,000	180,000	180,000	180,000	180,000	180,000	1,080,000
EPA	6,500	8,000	8,000	8,000	8,000	8,000	46,500
Project Office (NSC)	18,000	18,000	18,000	18,000	18,000	18,000	108,000
Total	2,692,793	3,460,693	3,849,584	4,028,776	4,231,776	4,539,776	22,803,398

Note : FY92-94 is the first phase, FY95-97 the second phase of the program. The budget for academic excellence program does not include salaries for researchers involved.

網站名稱 (Name/Region)	網站連結 (Web Site)
工研院奈米科技研發中心 (ITRI/2)	http://www.ntrc.itri.org.tw/index.html
中央研究院奈米科學實驗室 (Academia Sinica/1)	http://www.phys.sinica.edu.tw/~nano/index.html
台大與工研院合設奈米科技研究中心 (NTU/1)	http://partner.na.ntu.edu.tw/
清華大學--奈米與材料科學 (NTHU/2)	http://www.ess.nthu.edu.tw/laboratory/material/material.htm
交通大學奈米科技中心 (NCTU/2)	http://cnst.nctu.edu.tw/index.php
國立成功大學微奈米科技研究中心 (NCKU/4)	http://www.ncku.edu.tw/~nckumems/
國立中正大學奈米科技設計與原型研發中心 (NCCU/3)	http://nano.ccu.edu.tw/
中山大學奈米科技研發中心 (NSYSU/4)	http://www2.nsysu.edu.tw/nano/
中興大學奈米中心 (NCHU/3)	http://nanocenter.nchu.edu.tw/
輔仁大學奈米實驗網 (FU-JEN U/1)	http://140.136.194.8/news/
大同大學奈米材料實驗室 (Tatung U/1)	http://nanolab.mse.ttu.edu.tw/
南台科技大學奈米科技研究中心 (STSTU/4)	http://www.stut.edu.tw/nano/
華梵大學工學院奈米科技中心 (Hwa-Fan U/1)	http://www.nano.me.hfu.edu.tw
國家奈米元件實驗室 (NDL/2)	http://www.ndl.gov.tw/
同步輻射研究中心 (NSRRC/2)	http://www.srrc.gov.tw/chi/
國科會北區微機電系統研究中心 (NSC-N-MEMS/1)	http://nscmems.iam.ntu.edu.tw
國科會中區微機電系統研究中心 (NSC-C-MEMS/2)	http://vlsi2.ee.nthu.edu.tw/~nsc-cmrc/
國科會南區微機電系統研究中心 (NSC-S-MEMS/4)	http://140.116.176.15/upmain.htm
國家高速網路與計算中心 - Nano Science奈米科學網 (NHCC/2)	http://nano.nchc.gov.tw/
國科會科資中心奈米資料網 (NSC-STIC/1)	http://www.stic.gov.tw/policy/nano/index.htm



中央研究院基因體研究中心

Genomics Research Center, Academia Sinica



The Genomics Research Center new building is under construction, scheduled for completion in July, 2004.



財團法人

工業技術研究院



奈米科技研發中心

Nano Technology Research Center



National Cheng Kung University

Micro-Nano Technology Research Center

NANO CENTER

國立交通大學奈米科技中心
Center for Nano Science & Technology



National Nano Device Laboratories

NanoScience 奈米科學網



財團法人國家實驗研究院

國家高速網路與計算中心

NATIONAL CENTER FOR HIGH-PERFORMANCE COMPUTING



國科會科資中心 奈米科技資訊網

Nanoweb



台灣大學奈米科技中心



Center for Nano Science and Technology, NTU



南台科技大學

Southern Taiwan University of Technology

奈米科技研究中心

Nanotechnology Research Center

English

Chinese

Japanese

Core Facilities

- Two-step Approach—First Set up regional Common Laboratories to establish expert groups and electronic-networking system; then establish a Core Facility Research Center
- Regional Common Laboratories include
 - Characterization/processing laboratory
 - Nanomaterial simulation laboratory
 - Nanomaterials synthesis/production laboratory
- Sponsor programs for innovative new tools design /manufacture

National Science and Technology Program for Nanoscience and Nanotechnology

奈米國家型科技計畫

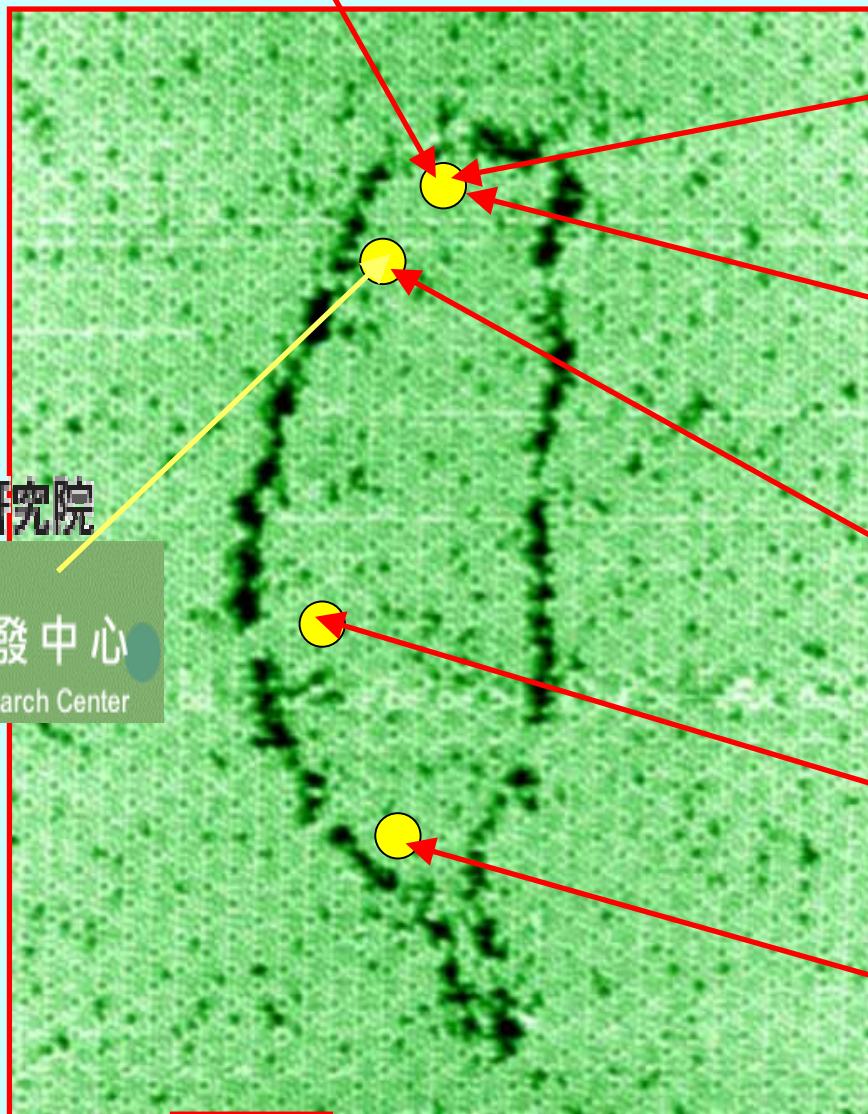


財團法人

工業技術研究院

奈米科技研發中心

Nano Technology Research Center



100 Å

Core Facility Program (5 Regional Programs) (1,5 M USD/Yr 3-year)

Prof. YAO,
YEONG
DER

Development of state-of-the-art research tools for nano-science and technology (Academia Sinica)

Prof. MOU,
CHUNG
YUAN

Center for Microscopy and Nano-Analysis (In NTU-Center for Nano Science and Technology)

Prof. LEE,
CHIEN-
PING

Core facility for nano fabrication and nano characterization (NCTU)

Prof. LUO,
REN
CHIEN.

Infrastructure Project of Nanoscience and Technology Center in Central Taiwan (National Chung-Cheng University)

Prof.
HSIAO,
FEI-BIN

Establishment of Core Facilities for Southern Taiwan Nanotechnology Research Center (NCKU)

Awarded Academic Research Programs for Fiscal Year 2003

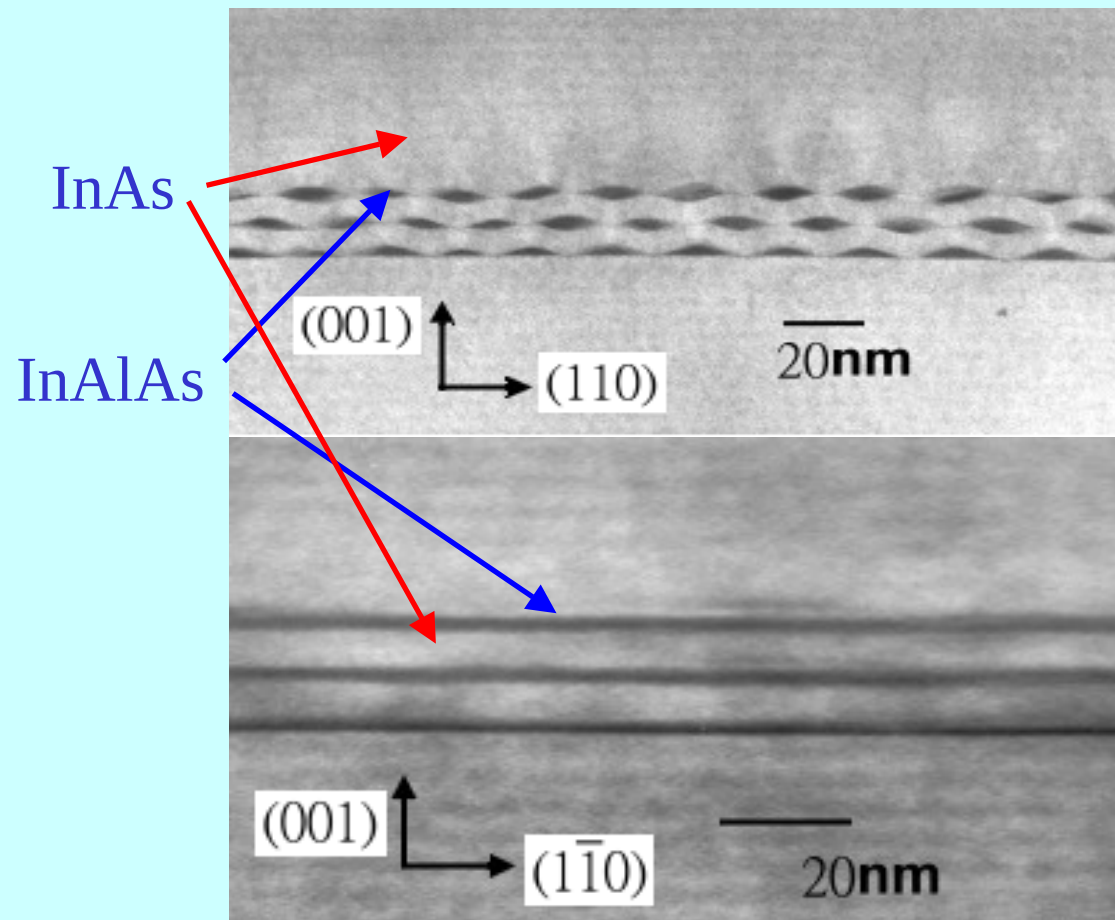
I. Academic Research Project (21 projects) (Support: Each ~0.5 Million USD/yr for 3 years)		
Affiliation (Region)	PI's Name	Title of the Project
NTHU (2)	CHIANG, NN-SHYN	Visualization, manipulation and quantitation of memory nano-molecules in action in living Drosophila brain
NCKU (5)	WU, HAO-LIANG	A novel strategy in target specific gene transfer and gene therapy utilizing superparamagnetic nanoparticles
NYMU (1)	WANG, YNG-JIIN	Growth and differentiation of cells on novel biomatrices of well-defined nano-collagen fibers
CYU (2)	CHANG, WATER H.	Advanced nanotechnology for monitoring cell and tissue activity---the use of quantum dot for biomaterial screening and intracellular activity monitoring
AS (1)	CHEN, CHII-DONG	Nano-bioelectronics-Detection of biomolecules
NTU (1)	MOU, CHUNG YUAN	Chemistry in Confined Space
NCTU (2)	KUO, CHENG-TZU	Fabrication and characterizations of process and mechanical/thermal properties of alloy-encapsulated carbon nanostructures for applications in nano-resolution storage media

Affiliation (Region)	PI's Name	Title of the Project
NTU (1)	SHEN, POUYAN	Fabrication, Assembly and Theoretical Calculation of Dense TiO ₂ & ZrO ₂ Nanocondensates
NCCU (3)	CHEN, CHIEN-CHONG	Novel synthesis and applications of carbon nanotubes
AS-NTU (1)	LUH, TIEN-YAU	Carbon nano-ball based Molecular Electronics
NCKU (1)	FUNG, KUAN-ZONG	The Study of Nano-structured Solid Oxide Fuel Cell
NCHU (3)	WANG, SHING CHUNG	Research on Mesoscopic GaN Quantum Confined Structures for Control of Photon Emission
NCU (2)	HSU, TZU-MIN	Single-Photon Nanoemitters: Physics and Fabrications
AS (1)	KUNG, ANDREW H.	Nonlinear photonic crystals and crystal fibers: fabrication, characterization, and device demonstration
NTU (1)	YANG, CHIH-CHUNG	Study on Self-organized InGaN Quantum Dots
NTU (1)	GUO, GUANG-YU	Ab initio studies of novel physical and chemical properties of nano-materials

Affiliation (Region)	PI's Name	Title of the Project
NTHU (1)	GWO, SHANGJR	Nano Sensing and Manipulating Using Scanning Probe Systems Assembled by Quasi Zero-D and One-D Functaional Materials
NCKU (4)	Zhang, Wei-Min	Quantum Information Science:Photonic and Electronic Control of Quantum Information Processing in Nanoscale Semiconductor Quantum Devices
NSYSU (4)	MEN, FU-KWO	Nano-scale manipulation and nano-catalysis
AS (1)	TSONG, TIEN TZOU	Characterizing and Manipulating the Site-specific and Structure-sensitiveProperties of Individual Nano Objects at the Atomic Scale
NTU (1)	SUN, CHI-KUANG	Nano Ultrasonics: Science and Technology

Some Examples

Semiconductor Quantum Structures and Quantum Devices—Stacked layers: InAs/InAlAs

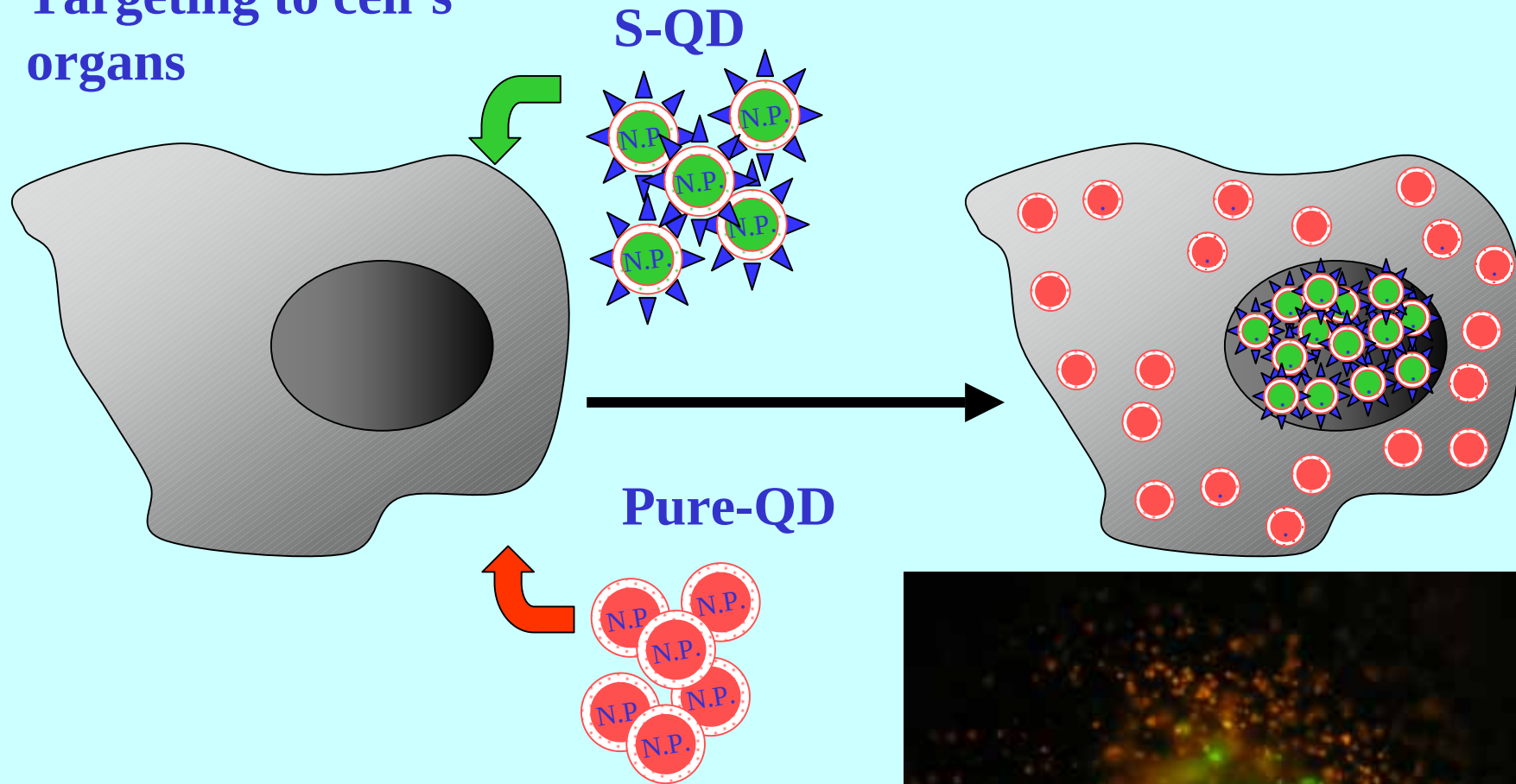


3.75ML InAs

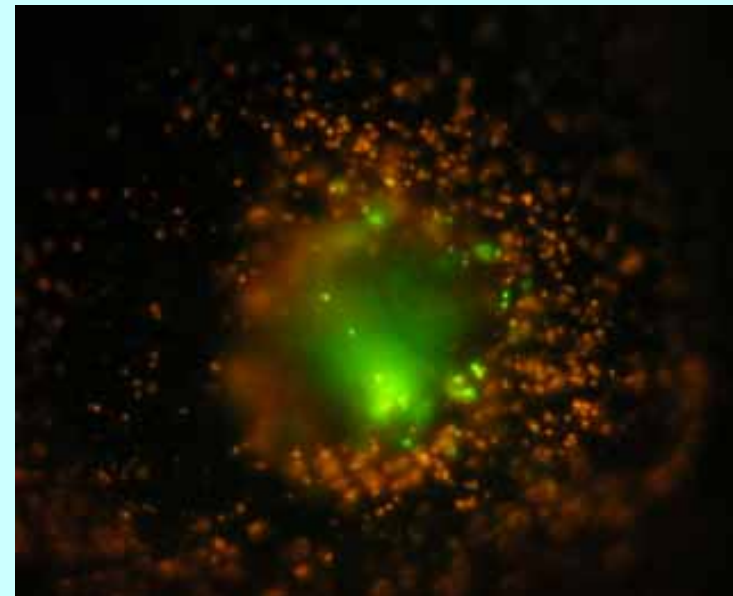
- Characteristic:
 - 14~23 nm width
 - 2~4 nm height
 - No dislocation
 - QWrs
 - Spatial Anti-Correlation

From Prof. C.P. Lee, NCTU

Targeting to cell's
organs

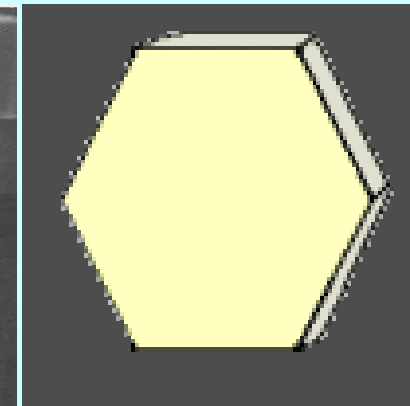
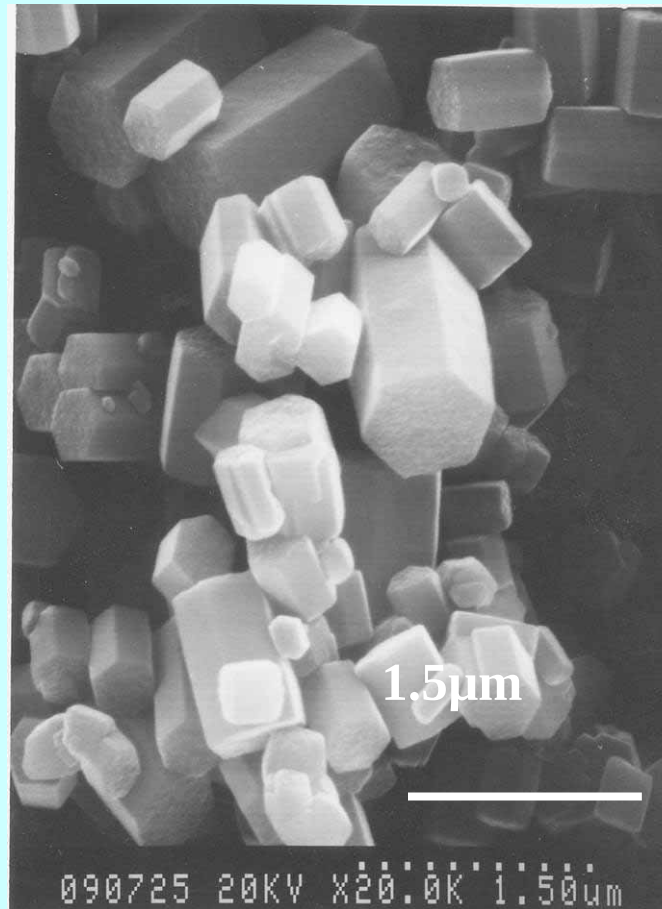
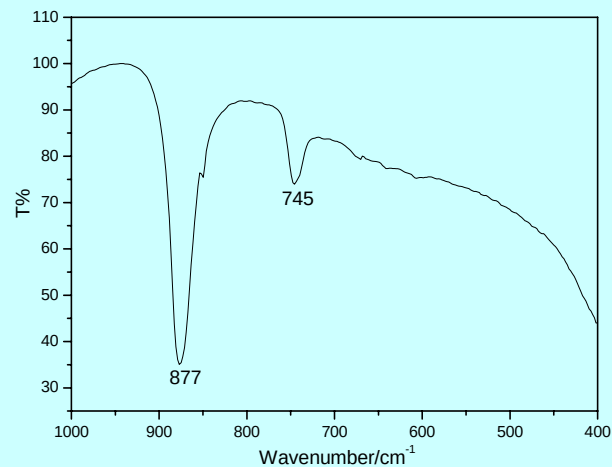
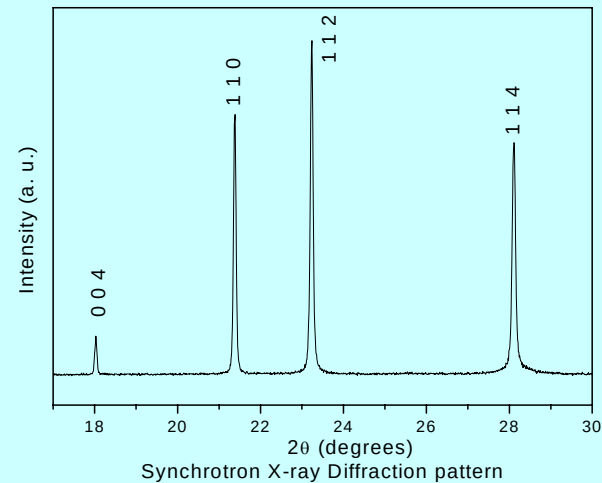
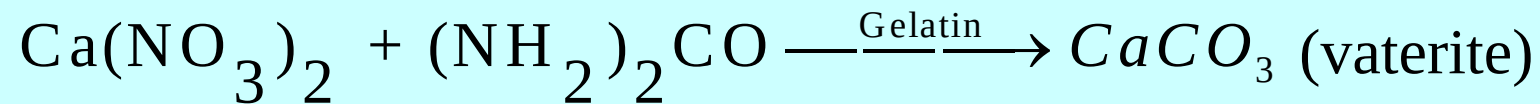


Confocal Image of a cancer cell labeling by Q-dots



From Prof. C.J. Chen, NTNU

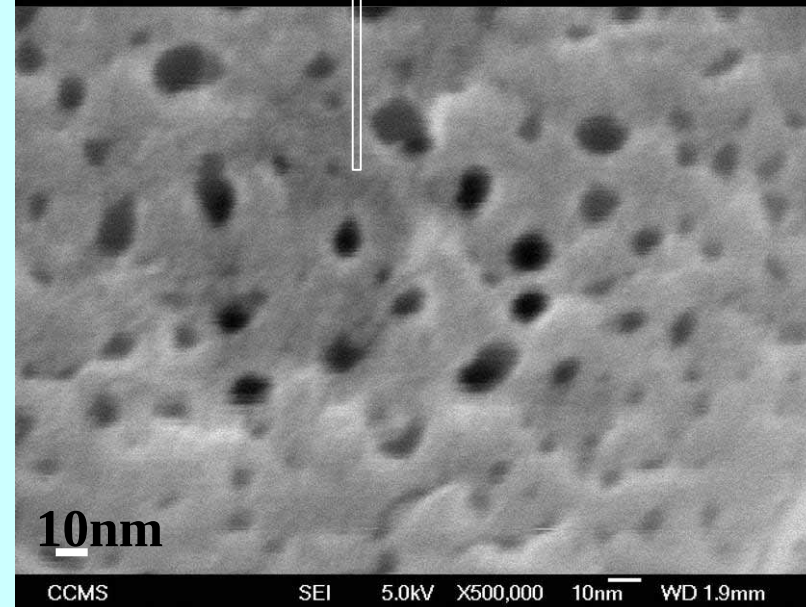
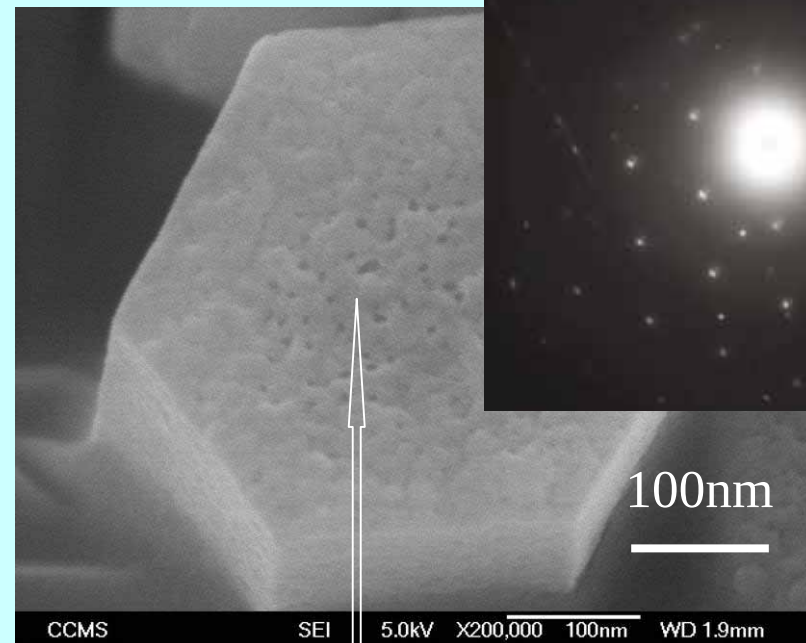
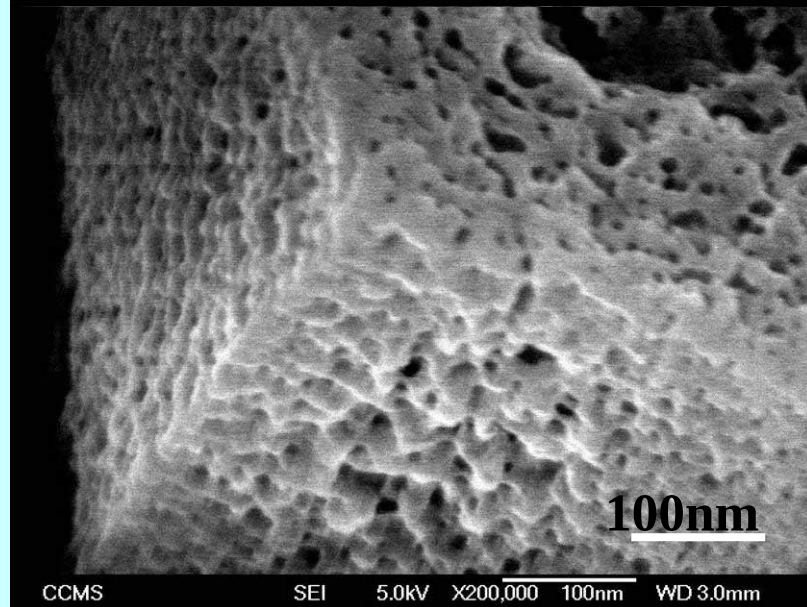
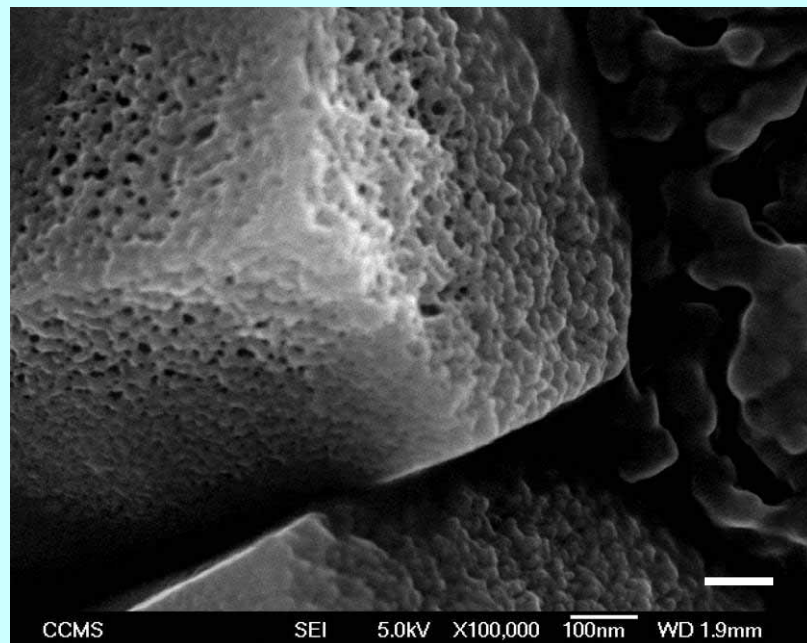
Biomimetic formation of Calcium Carbonate



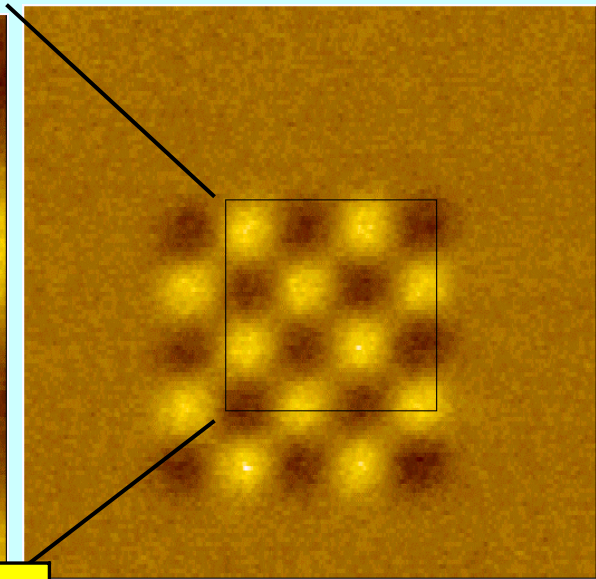
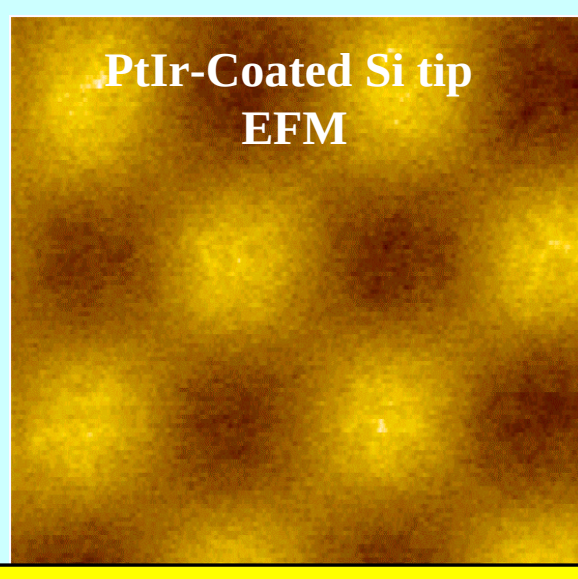
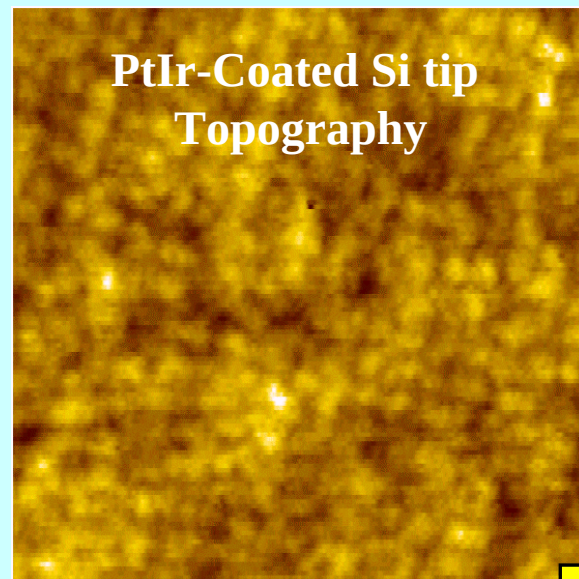
S. G.: P6₃/mmc (194)
a = 7.1473Å,
c = 16.917Å

From Prof. C.Y. Mou, NTU

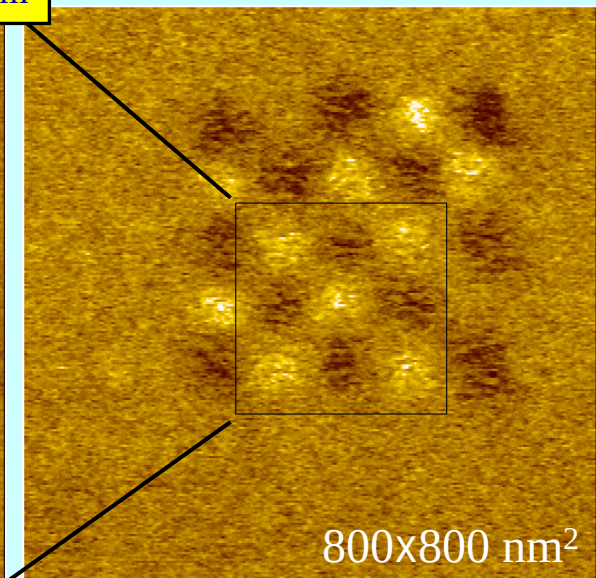
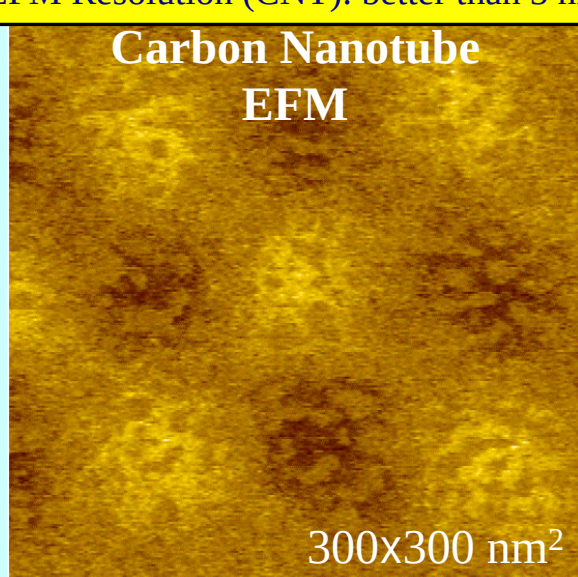
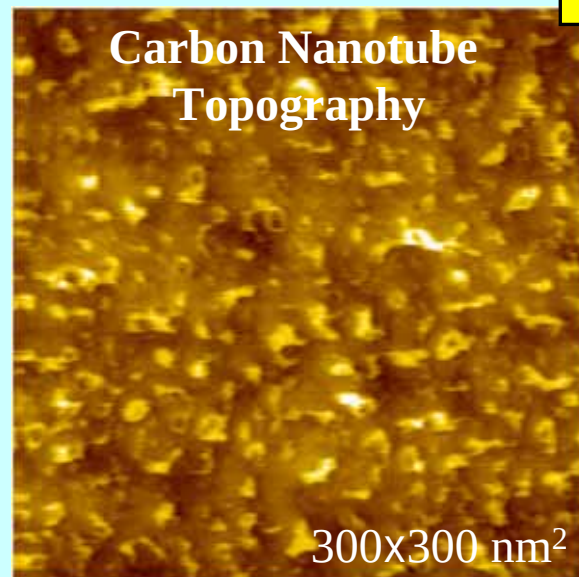
FE-SEM



From Prof. C.Y. Mou, NTU



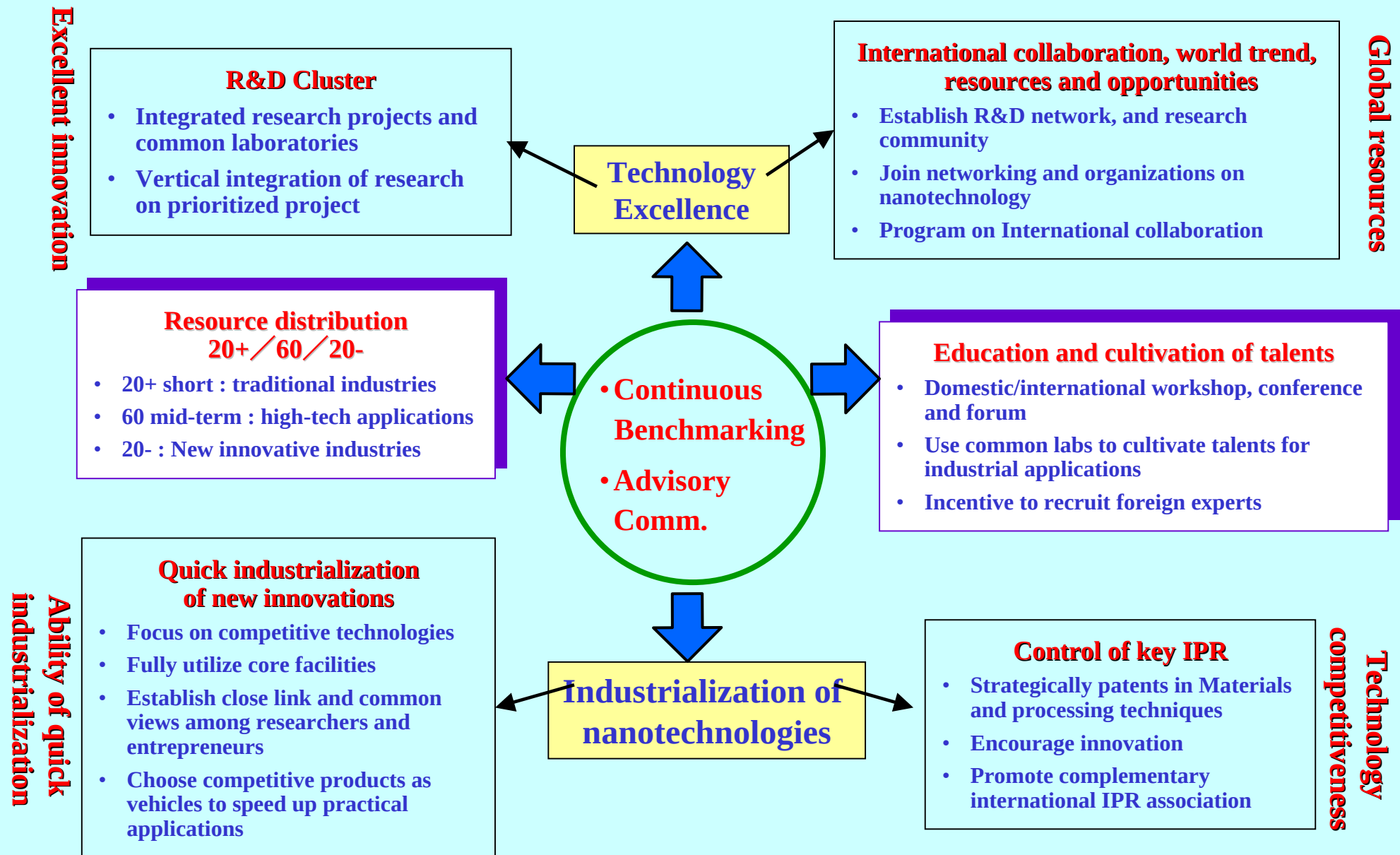
EFM Resolution (CNT): better than 5 nm

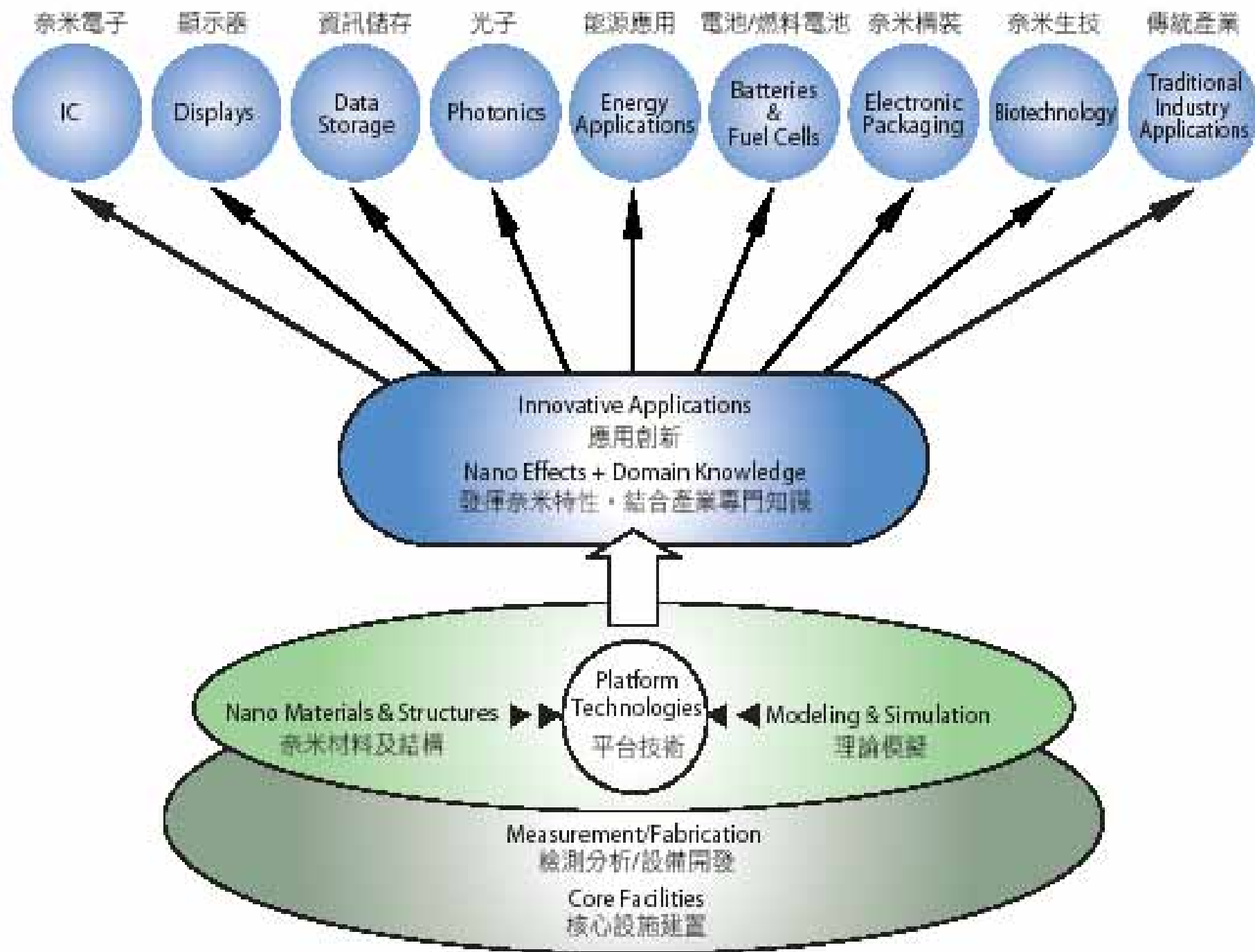


Charging conditions: ± 10 V voltage pulses (1-ms pulse-width for PtIr-coated Si tip, 1-s pulse-width for CNT tip); Charge storage media: $\text{Si}_3\text{N}_4/\text{Si}$ (experiments in high vacuum)

From: Prof. S. Gwo, NTHU

Strategy for Industrialization Nanotechnology Program

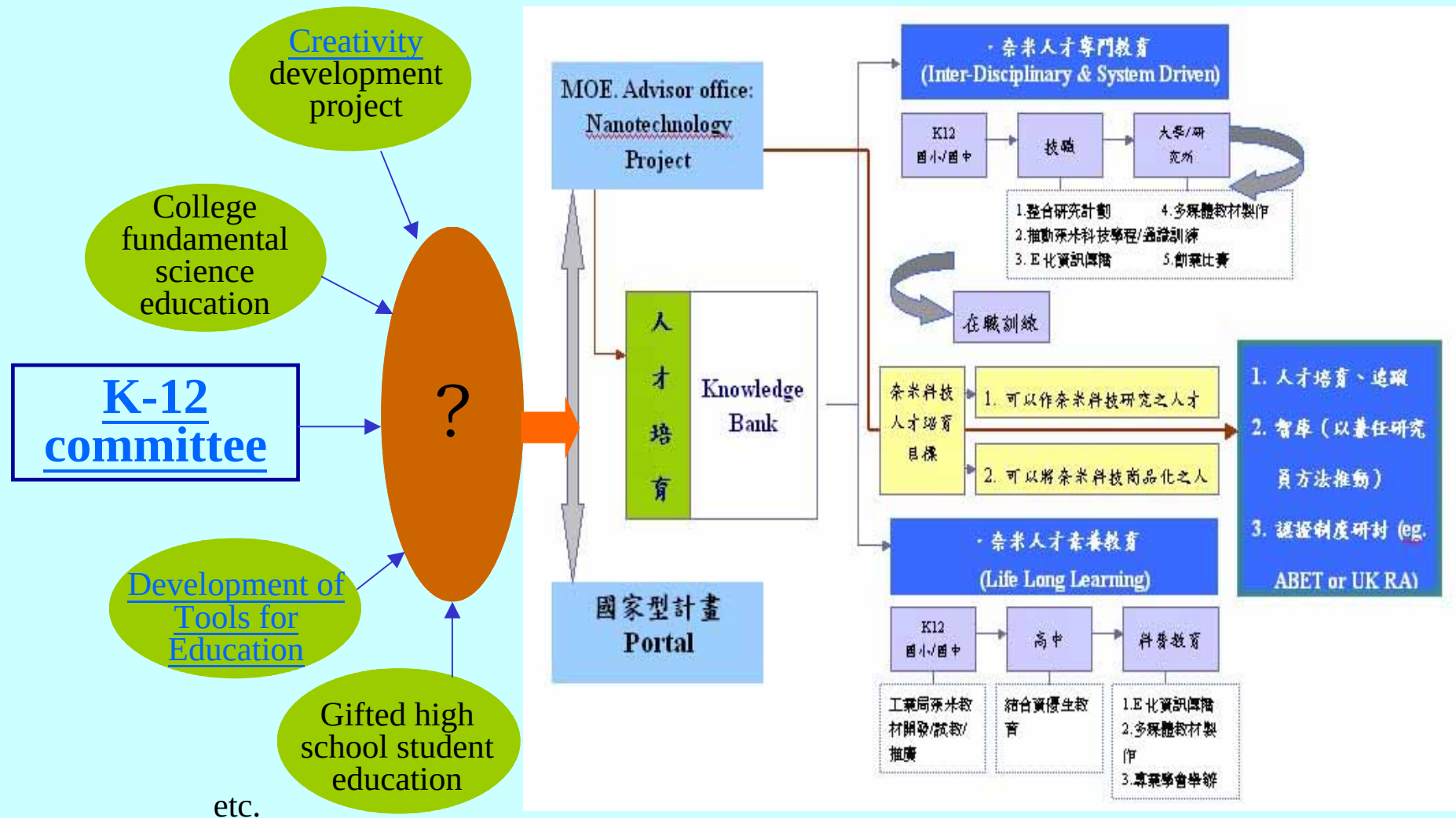




Education Program

- Establish interdisciplinary nanoscience & technology curricula
- Enhance basic science knowledge (from high school)
- Promote international collaboration and personnel exchange
- Recruit talents from abroad including personnel from mainland China
- Promote academic-industry collaborating research and personnel exchange

Structure of Regional Nanotechnology Personnel Development Center Project (1)



International Collaborations

- Joint Research Projects (NSC, AS, ITRI, MOE)
- Research Personnel Exchange (NSC, AS, ITRI, MOE)—Postdoctor, PhD students, Exchange Scholars, Distinguished Visitors
- International Workshops and Conferences (NSC, AS, ITRI)
- Join International Networking (NSC, AS, ITRI)
- Actively recruiting eminent scientists from abroad (NSC, AS, ITRI)

***Thank you very much for
your Attention***