

e-Taiwan

e-Society



We also have a dream:



Use next 30 years
to build a bio-centered
society in Taiwan, a first in
the world.

Sociobiology
Behavioral biology
Neurosciences
Epidemiology
Ecology
System biology
Molecular & Cell Biology

Formosa, a beautiful island with a great people

Bio-e-Taiwan

Bio-e-Society



BioTaiwan

- A population with a deep understanding of biology, sociobiology, population genetics, ecology, etc.
- A country with 100,000 Ph.D.s in biology.
- Revamping bio-education from school to media to home.
- Including biology in major policy decisions.
- To yield the healthiest population, an effective healthcare, **a competitive life science industry**, a forward environmental policy and a pioneer in applying biology to electronics, nanotechnology, material sciences, software, imaging, aviation, etc.

A Competitive Life Science Industry

- To build a world-class biotech industry in Taiwan within 30 years.
- To establish **BioTaiwan Authority**.
- To raise **BioTaiwan Mega Fund**.
- To found and nurture >100 biotechs in Taiwan via tech transfer and joint ventures with pharmas, biotechs and universities in US, Europe, Japan and Israel.

BioTaiwan Mega Fund

Aiming to be the first biotech fund in the world able to identify technology, conceive new product ideas, recognize market demands, recruit key personnel, build necessary infrastructure, align partnerships with government, academia and industry, raise fund, nurture it, lead subsequent rounds, IPO, and expand it with networks in Taiwan and Wall Street, all pro-actively.

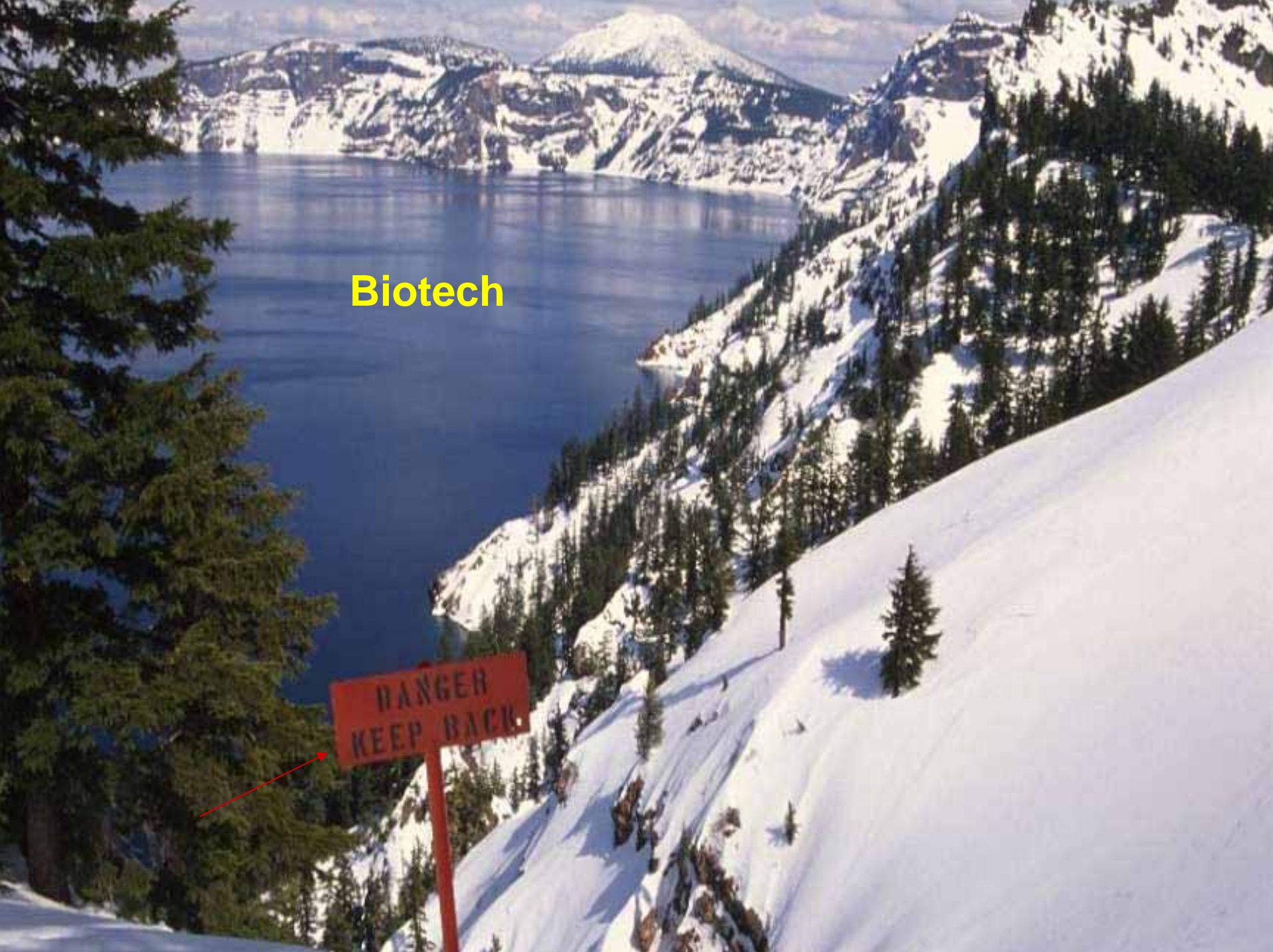


**In Taiwan
Investors'
Minds,
Biotech
Is too
risky**

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Biotech

**DANGER
KEEP BACK**





**Global
Healthcare
Market:
>US\$2 Trillion**

Electronics vs Life Sciences

Worldwide sales in 2003:

**Chip, US\$141B;
Pharmaceuticals/diagnostics/devices, US\$400B.**

**All electronics: <US\$500B;
Healthcare: US\$1.5T.**

Taiwan's market shares in 2003:

**Electronics: 20-80%, hard to grow
Life Sciences: <0.1%**

MIT 2003 undergrads major in:

**Electronics: dropped by 90% (compared with 1975)
Life Sciences: increased by 1,000%**

Bill Gates

**If I were to
start a
company
today, it
would be
a biotech.**



Market Caps

Pfizer = Sony + Matsushita
+ Sharp + NEC + Toshiba
+ Nintendo



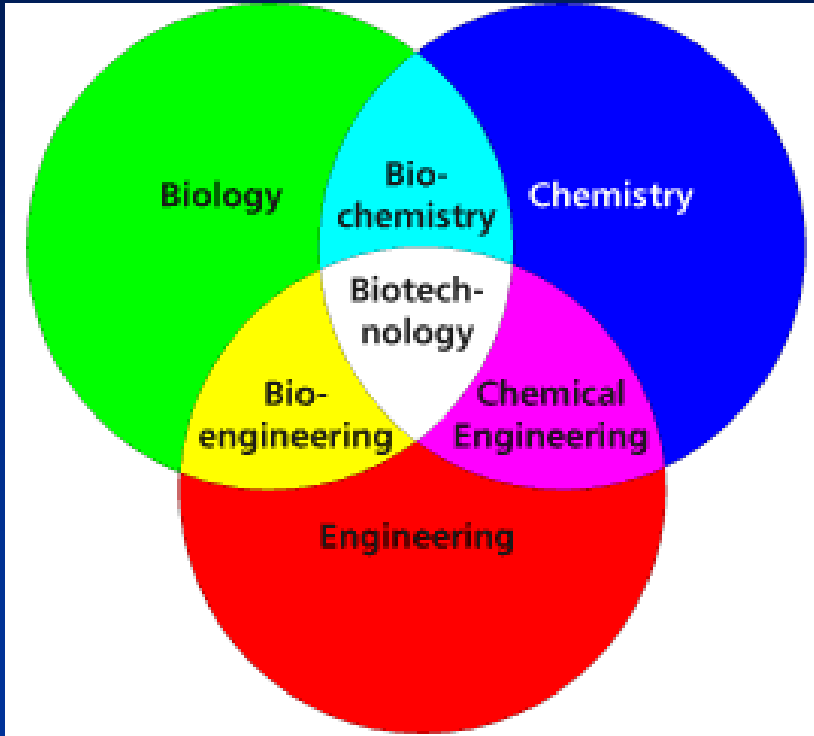
Annual Sales and Profits

Lipitor

Sales: US\$10 Billion

**Profits: US\$8 Billion,
which is **NT\$2,640 Yi****

Biology Revolution



Human Diseases



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Why Now?

- Generation gap. Most Taiwanese talents in biotech in US will retire in the coming 10 years.
- Few Taiwanese Ph.D. candidates in biology & chemistry in US today.
- Taiwan may be forced to hire foreigners to build this essential industry when Taiwan needs it.
- China is rising. Taiwan is already behind in biotech competition.
- Korea is far ahead of Taiwan with 3 drugs approved by US FDA, as a leader in stem cells, and a US\$2 billion biotech center in San Diego.
- Even India, already produced biotech billionaire.

Singapore has leader in Philip Yeo

Life Sciences Promotion in Singapore



ATIP/Singapore

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ABSTRACT: Singapore has embarked on an ambitious program to establish itself as a hub for life sciences research and industry. This report describes several of the new organizations and projects and provides an assessment of likely future trends.

US wary of South Korean plans for California biocenter

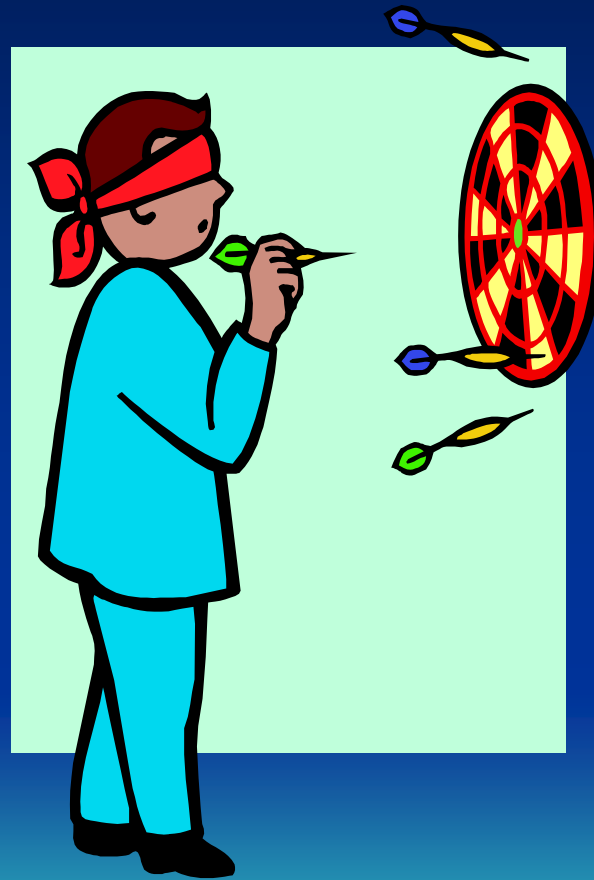
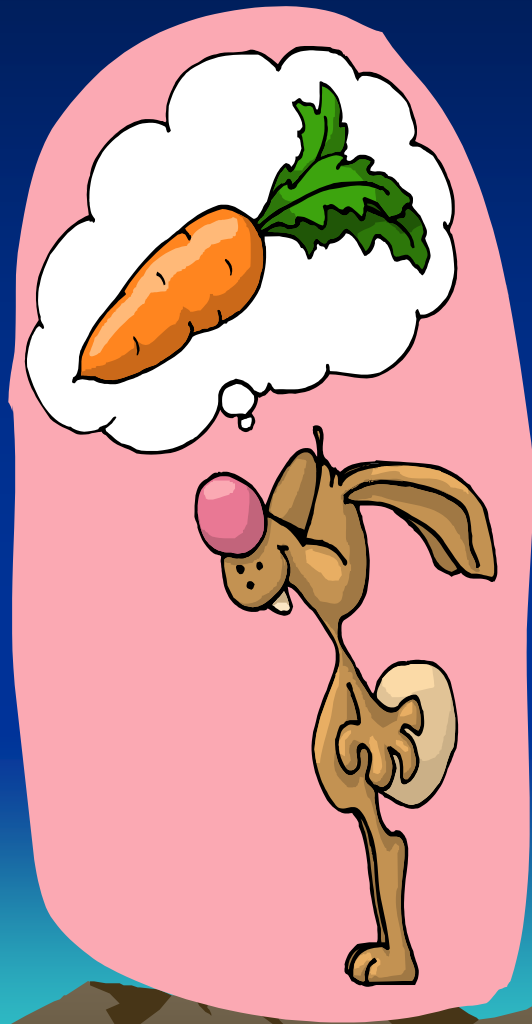
US counterintelligence officials are warning that plans for a Korean BioValley in San Diego could be the prelude to industrial espionage.

Nature Biotechnology 20:321
(April, 2002)

More Reasons

- Chinese Pride. Not one drug approved by US or Europe in history was developed in Chinese-speaking regions.
- Chinese-Prone Diseases. Not addressed by Western pharma/biotech.
- Highly suitable for Taiwanese personality.
- China: 2010, 5.3 years away, NT\$19,800 Yi, pharmaceuticals alone!

Current Status of Taiwan Biotech?



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**Building Biotech
Is like Building a Spider Net**

Needed Pillars

- Leader: The Spider
- Captials
- Talents
- Culture
- Infrastructure
- Laws
- Education





**Almost
Mission
Impossible
by current
status**



Multiple Problems

Too Many Chefs in the Kitchen?

**Yankee
Ingenuity:**

**Taiwanese,
even more
ingenious!**



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A Chinese Success Story

Taxol in Nanoparticles



Leaders

Capital

BioTaiwan-001

Vertical
Lift-off
for Taiwan
Biotech.
Possible

Talent

Culture

Law & Regulation

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#1 Capital

#2 Capital

#3 Capital

#4 Capital

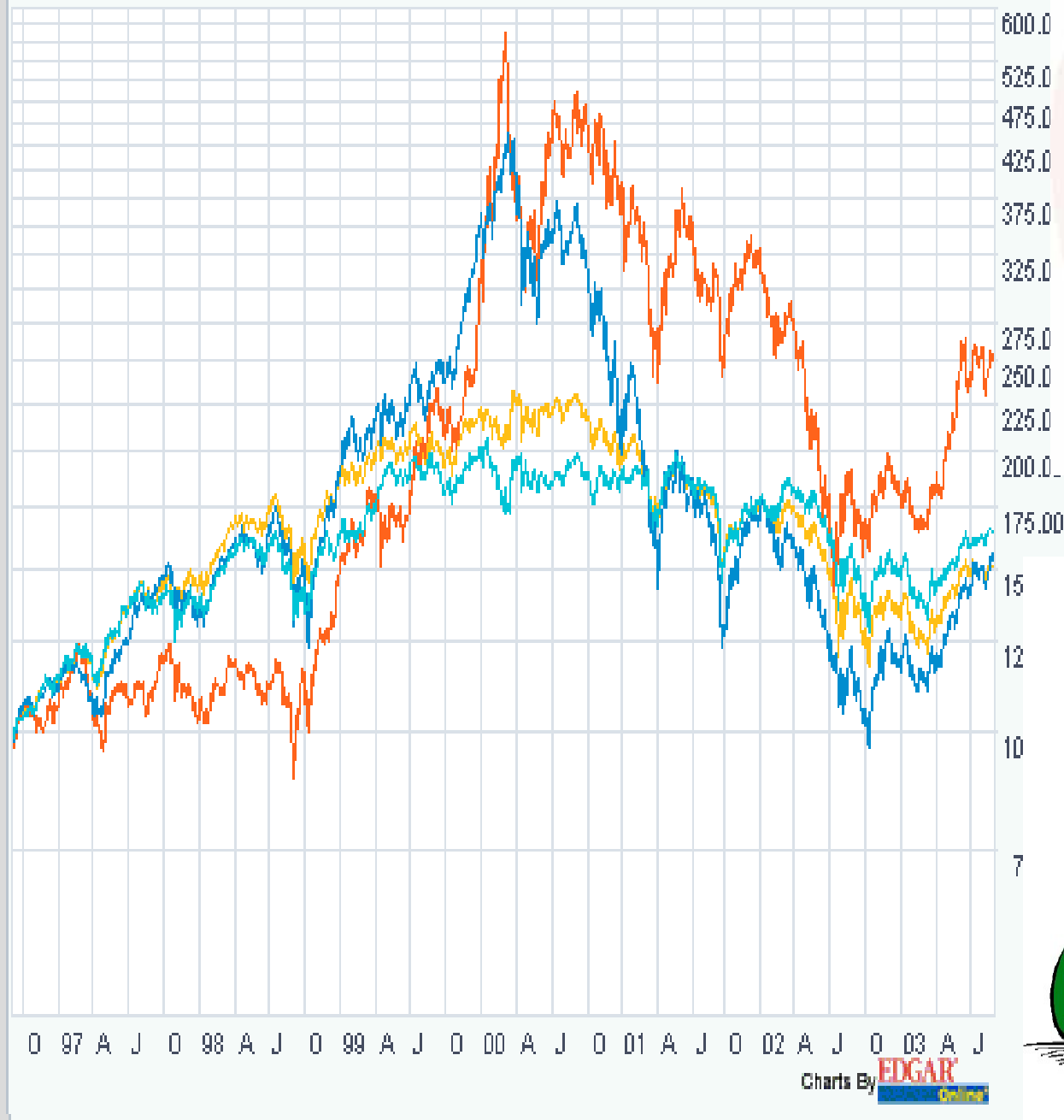




WALLSTREET

7 Year

09/02/0

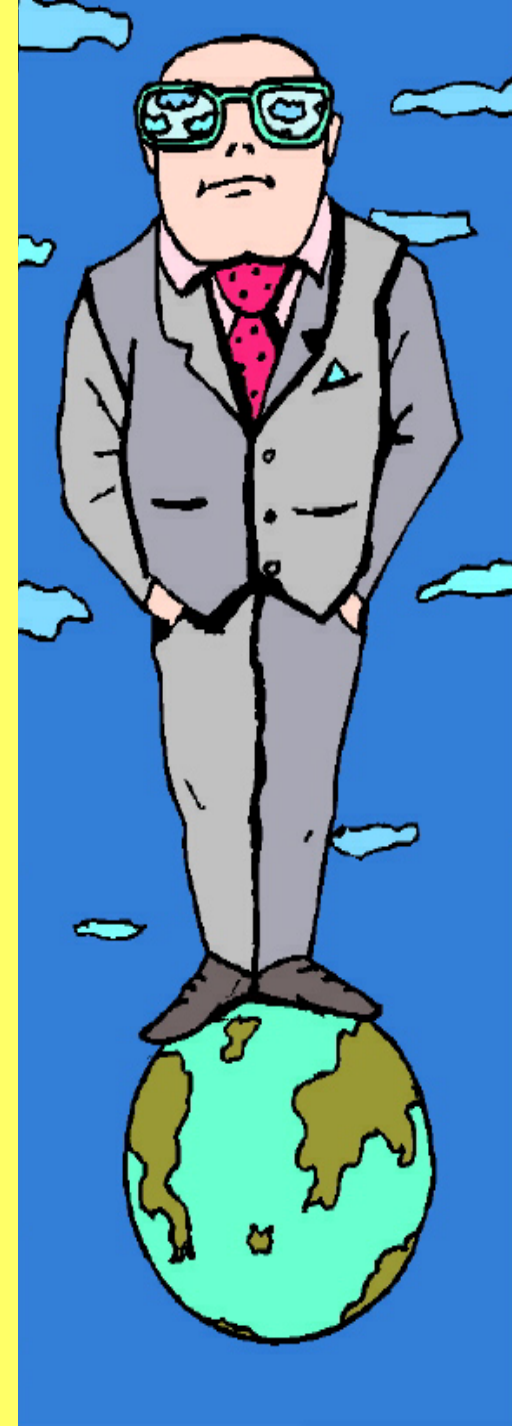
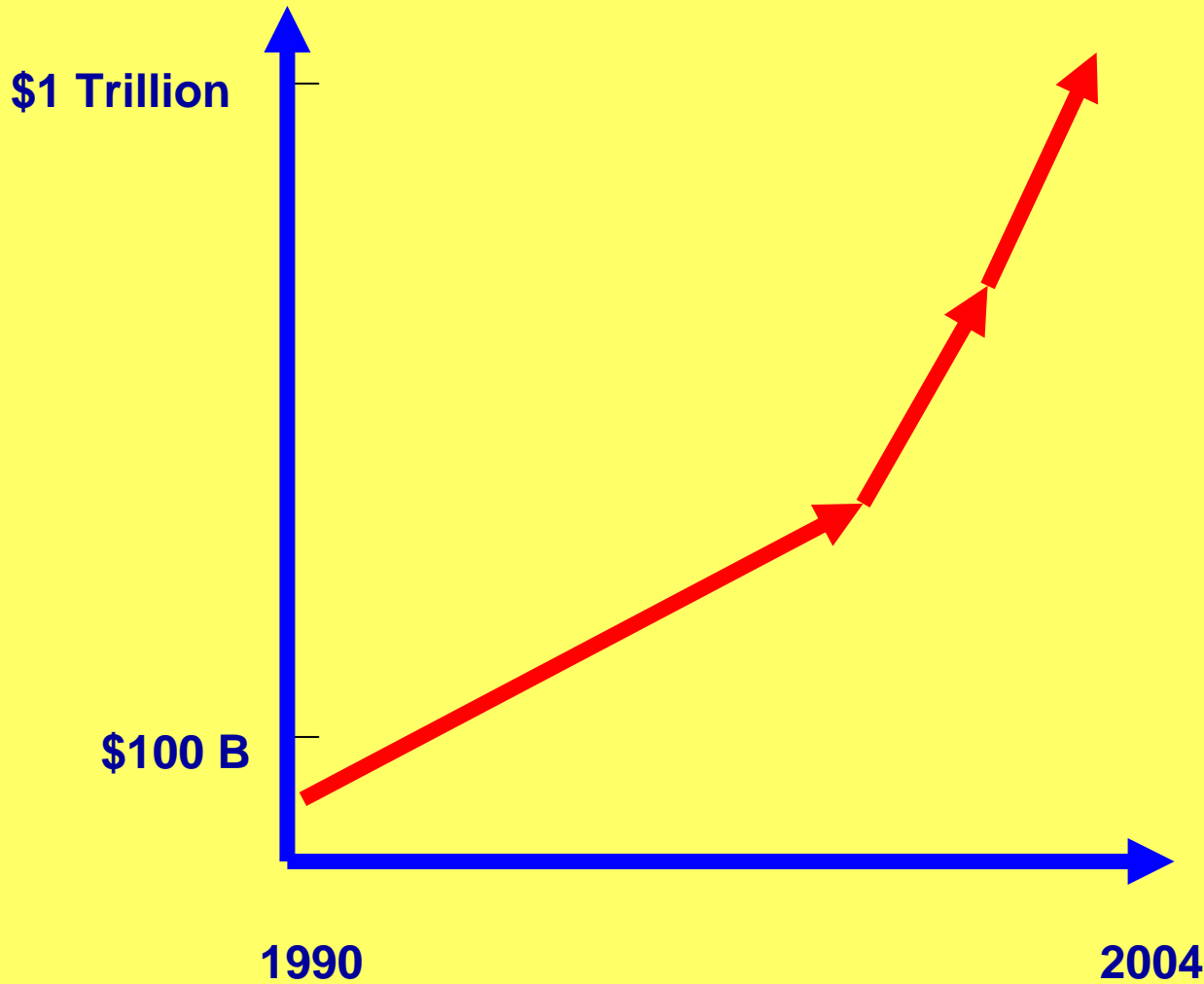


COMP SPX NBI .INDU

Charts By EDGAR Online

Click on the chart to view the underlying

Total Hedge Fund in US



****Mutual Funds 5X**



Biotech Fundraising in Taiwan

F. 建議作一個“踏實、務實且宏觀的長期規劃” → 百億美金計劃

- (3) 此公司成立後，立即發行金融債券每年10億美元，分四年發行，共發40億美元。
- (4) 此公司成立後，也分期與各大銀行共同召募創業投資基金，由此公司及各銀行共同管理，管理費均分，則由此公司提供投資機會，
並由各大銀行組成之基金董事會及經營團隊決定是否投資。
創投基金可分為十個，每個基金約五億美元，共計50億美元，分五年募足。
- (5) 發行基金，並投資於國內外生化公司（已上市或即將上市者）。

Funds

- Stage 1: Taiwan BioVenture Company
(founded by YFY Chairman Ho)
- Stage 2: Translational Fund (US\$250M)
- Stage 3: BioTaiwan Mega Fund (US\$1B)
- Stage 4: Bio D Fund (US\$10B)



**Where to fish
is the hardest**

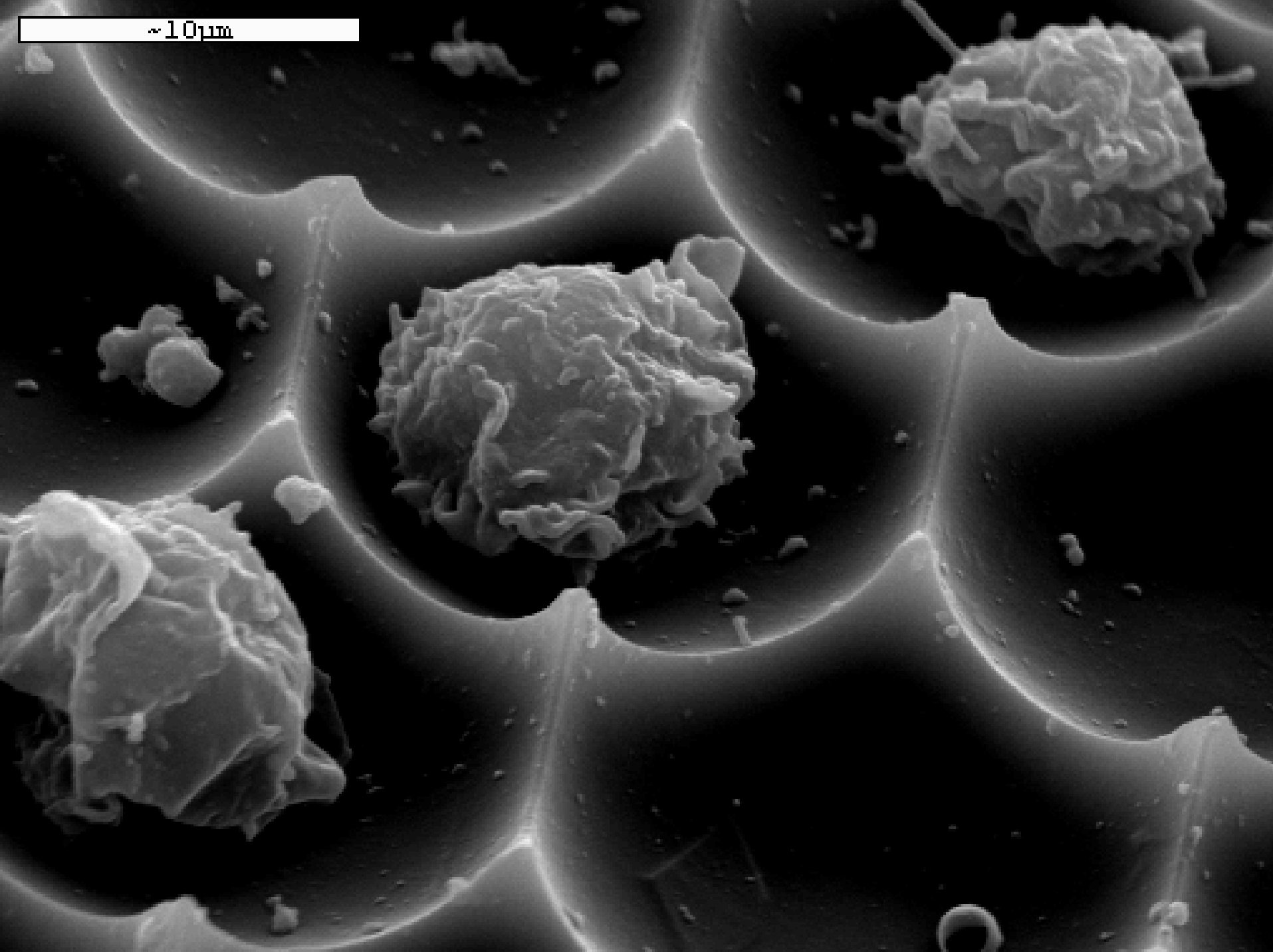
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Start from what Taiwan is good at

- Semiconductor
- Precision Instrument
- Traditional Chinese Medicine
- Sensors
- Fermentation
- Agro/Orchid
- AquaFarm

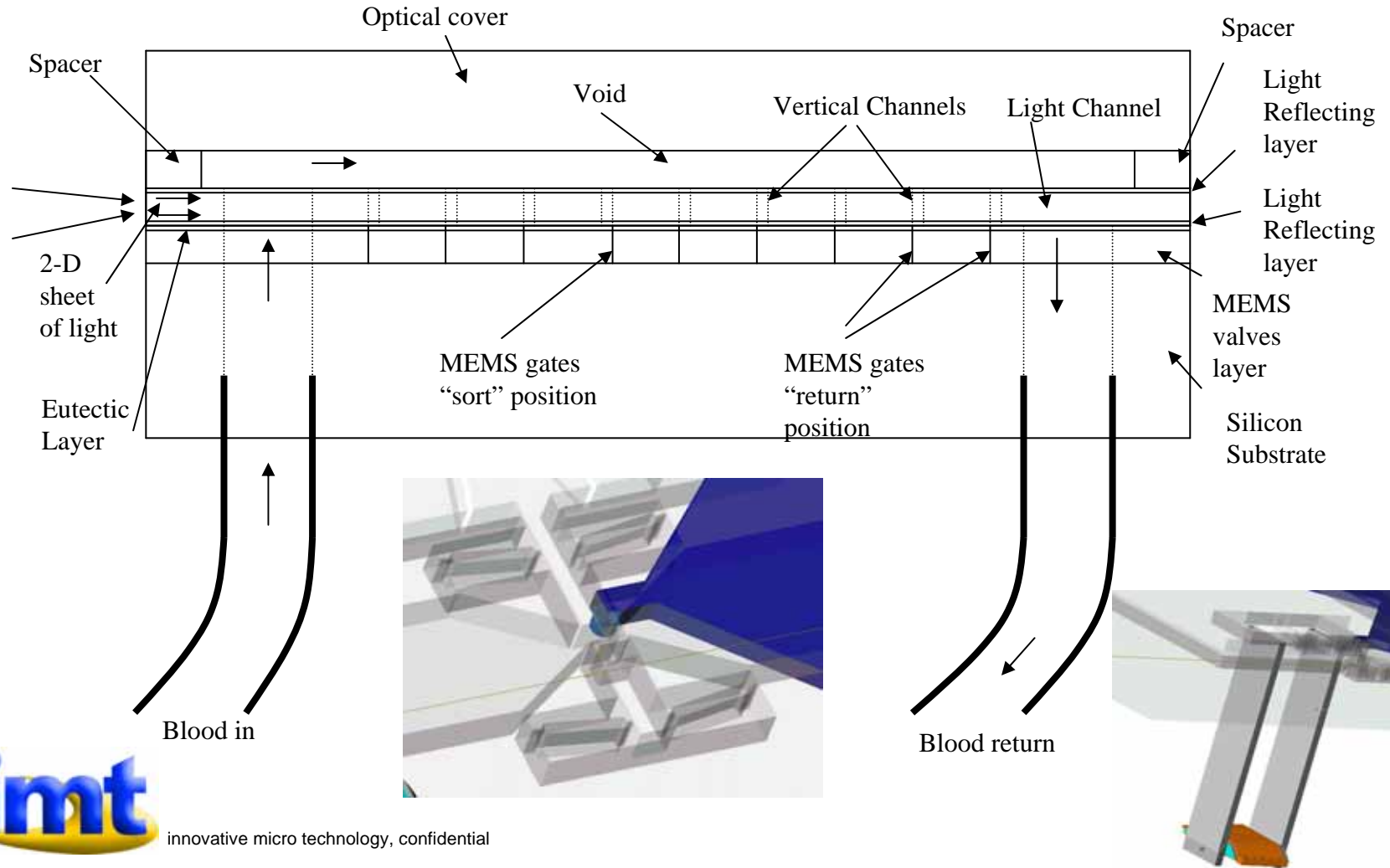
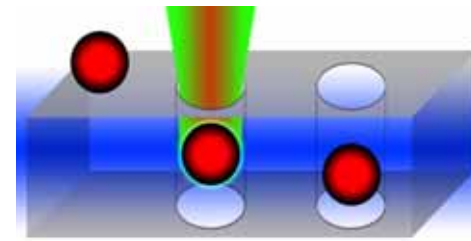


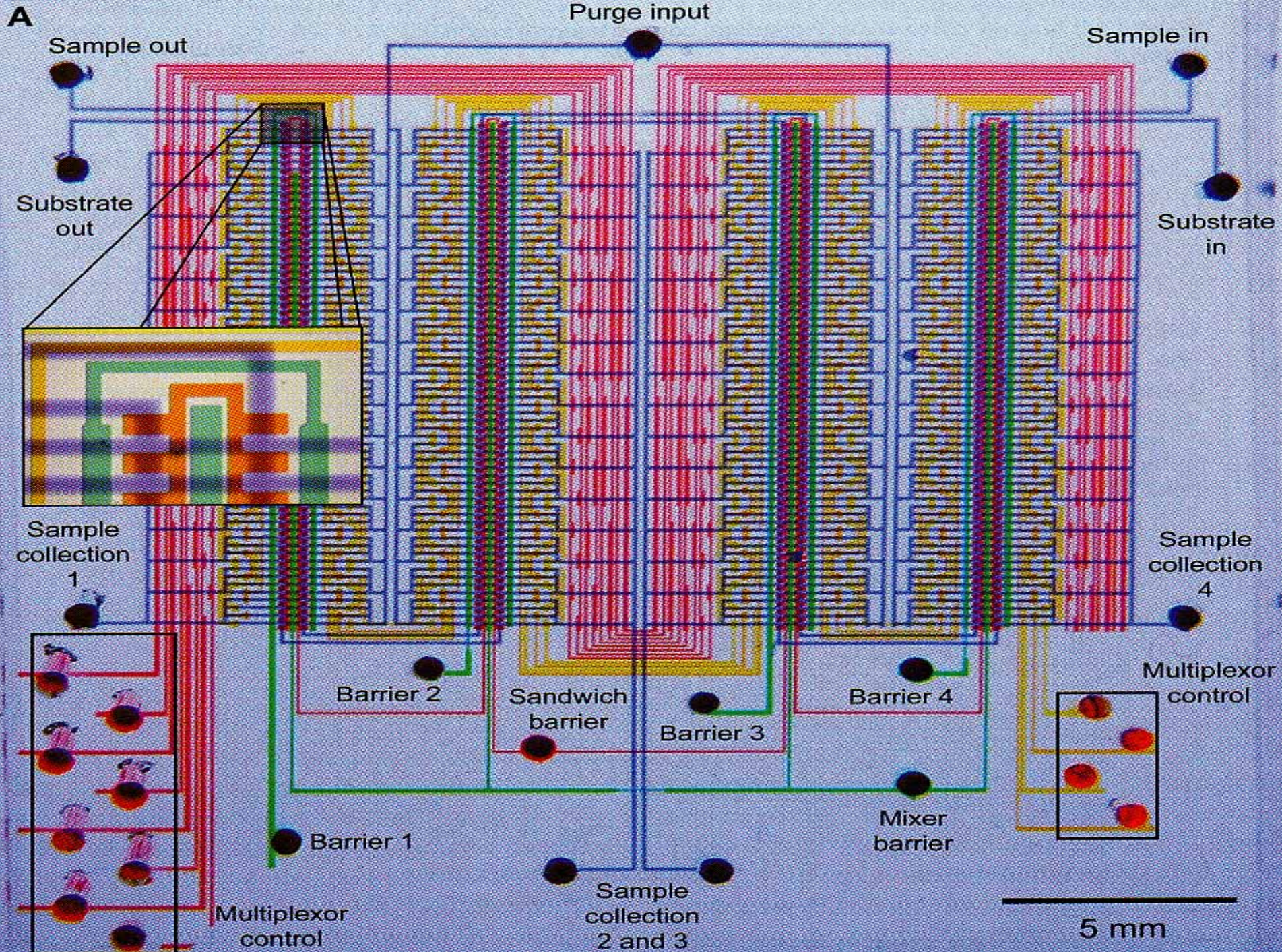
~ 10 μ m



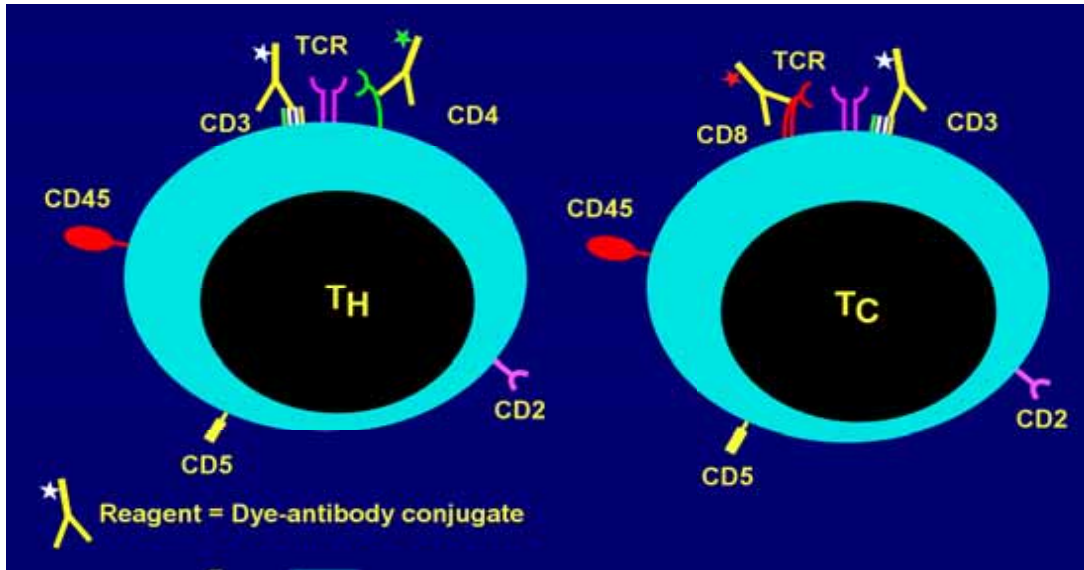
MEMS Cell Sorter Chip

(Side View)





Comprehensive Cellular Phenotyping



- 64 3-color assays
10 μ L each
> 200 populations
- 16 instruments operating in SurroMed's BDL and at two collaborator sites
- Walk-away data acquisition / processing
- > 90,000 clinical study assays performed
- Proprietary hardware, software, disposables, reagents

Scannery Row

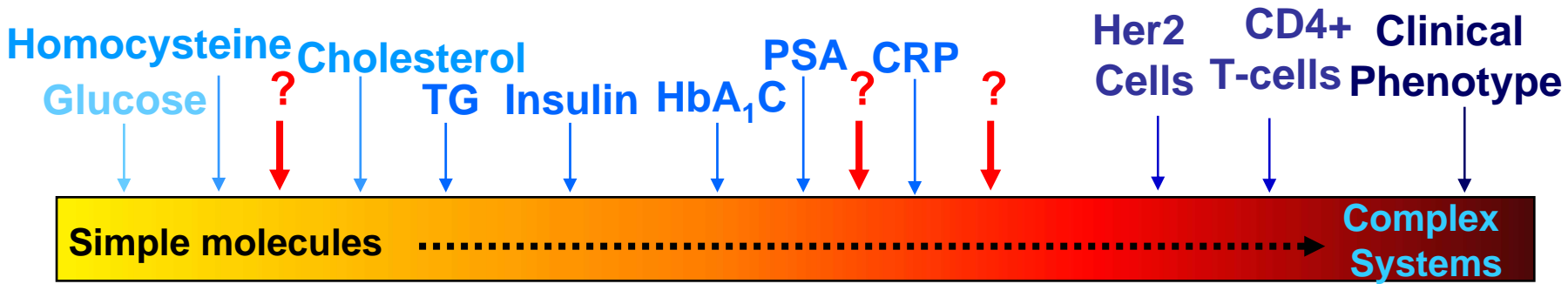


Disposable Capillary Array



See Kantor et al *Biotechniques*, March 2004

Taiwan is leading the field of mass spec in the world

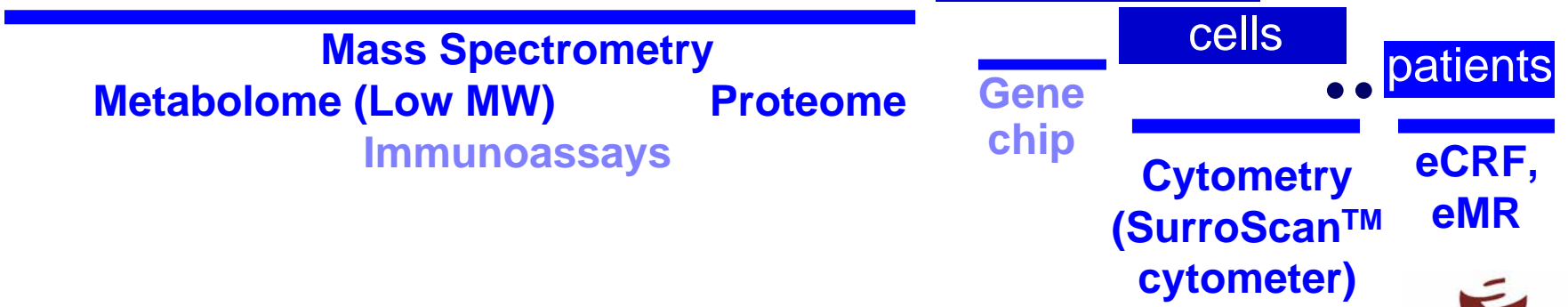


- metabolites
- carbohydrates
- steroids
- lipids

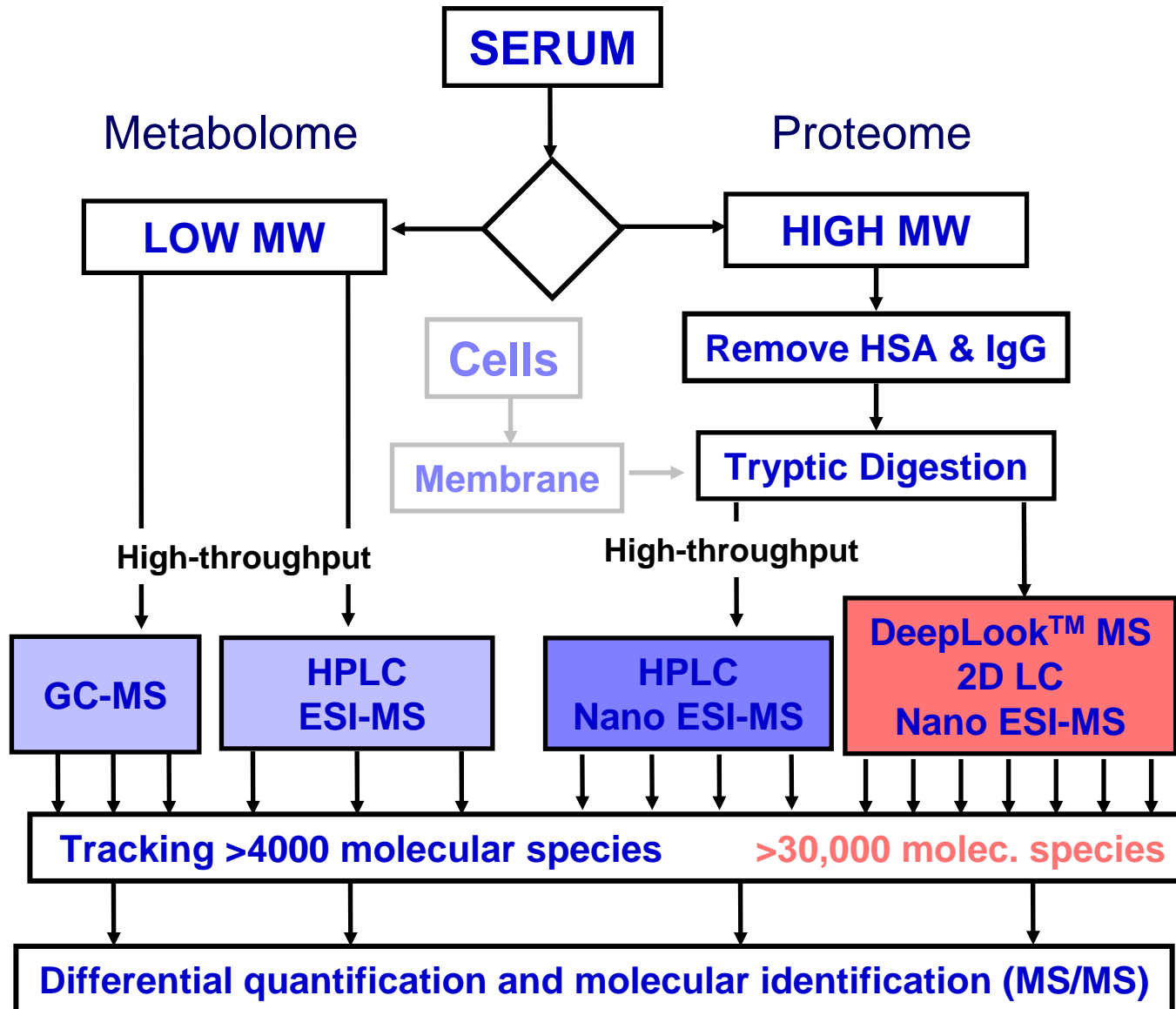
Taiwan has first single cell mass spec

- peptides → proteins
- protein complexes

SurroMed Technologies:



Multi-Dimensional Proteomic/Metabolomic Analysis



Still River System

- Proton beam for radiation therapy
- >US\$100M, too expensive, only 2 in US
- US\$10M is possible by MIT Plasma Center
- Superconducting magnet at 10 T can be made in Taiwan at low cost
- Worldwide demand: thousands
- Still River Taiwan with Taiwan Synchrotron Center may enter joint venture



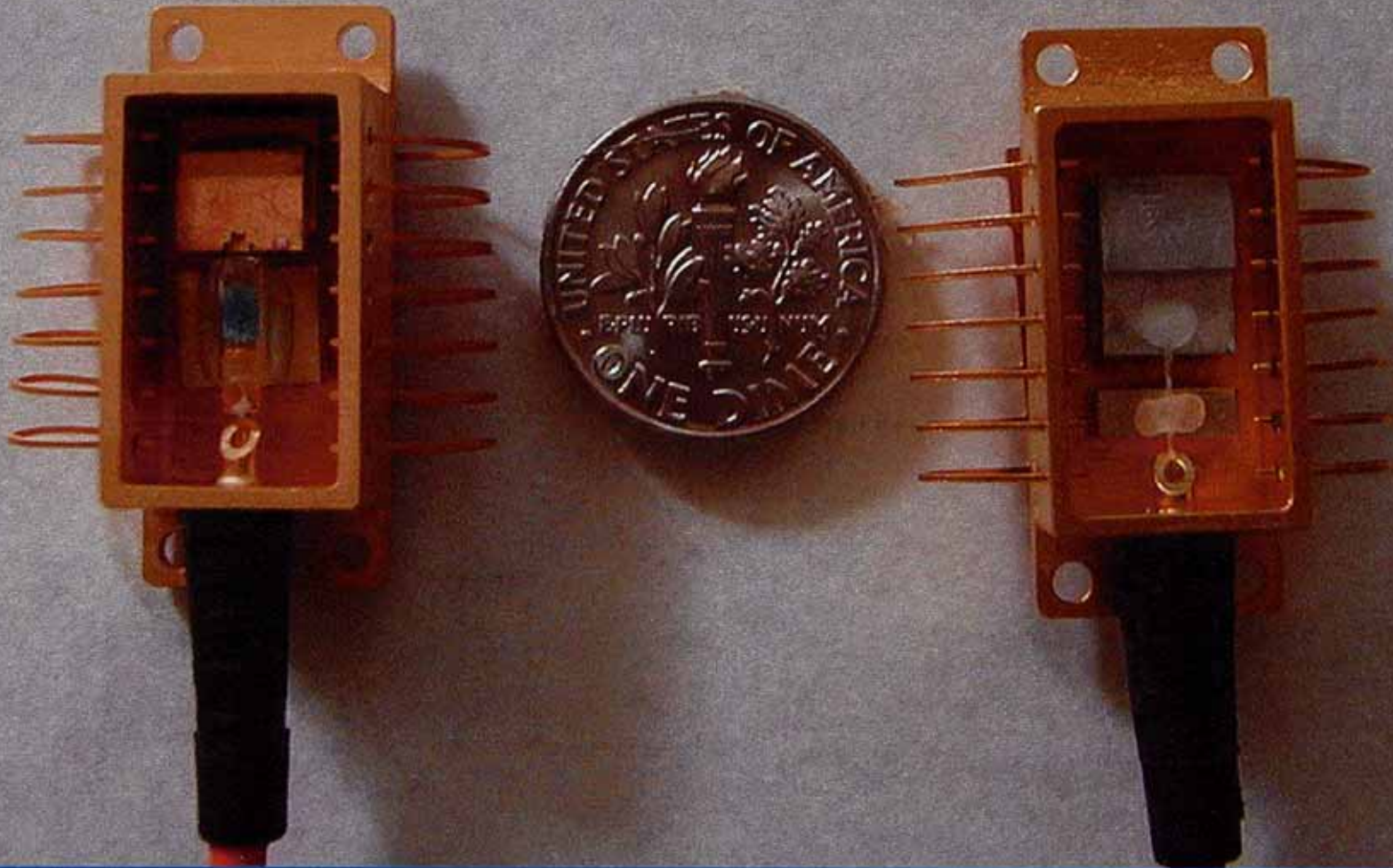
Terahertz Biosciences

- First generation chip to detect terahertz waves has recently been made in England.
- Biological systems emit and interact with terahertz waves. Terahertz biology is in its infancy. Ground-breaking discoveries may be made in Taiwan. Applications abound and products in sight.
- Taiwan's semiconductor industry can build next generation terahertz sensor chips via JV with England.
- Low-cost manufacturing will determine the ultimate winner, favoring Taiwan's strength.



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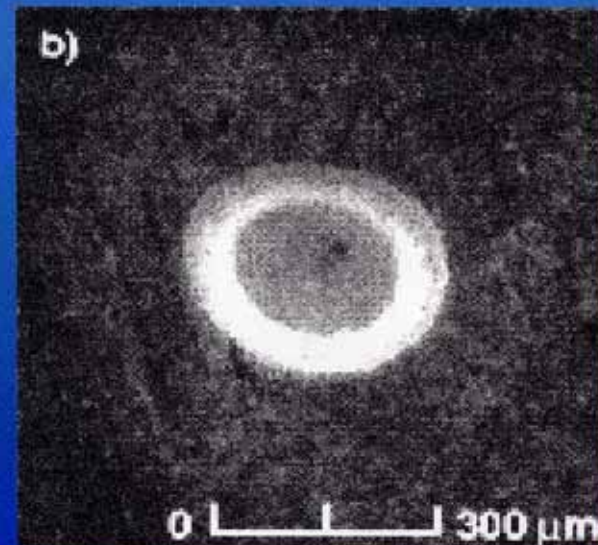
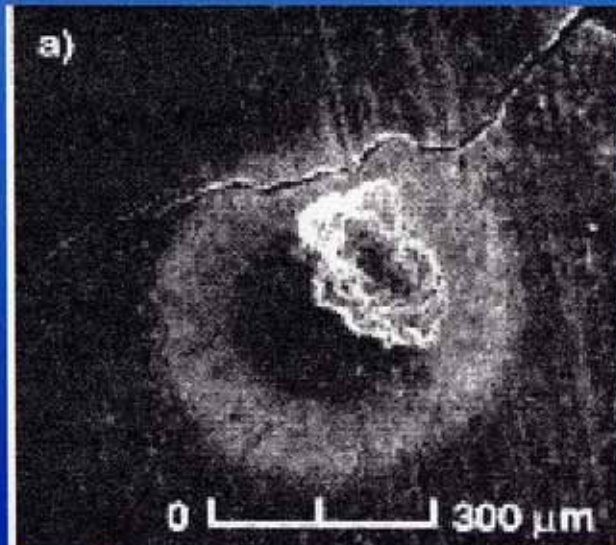
Femtosecond Laser



Laser Drilling of Tooth Enamel

Left: 1.4 ns Laser Pulses, large HAZ, cracking, and $\Delta T = 40\text{ }^{\circ}\text{C}$

Right: 350 fs Laser Pulses, small HAZ, no cracking & $\Delta T = 2\text{ }^{\circ}\text{C}$



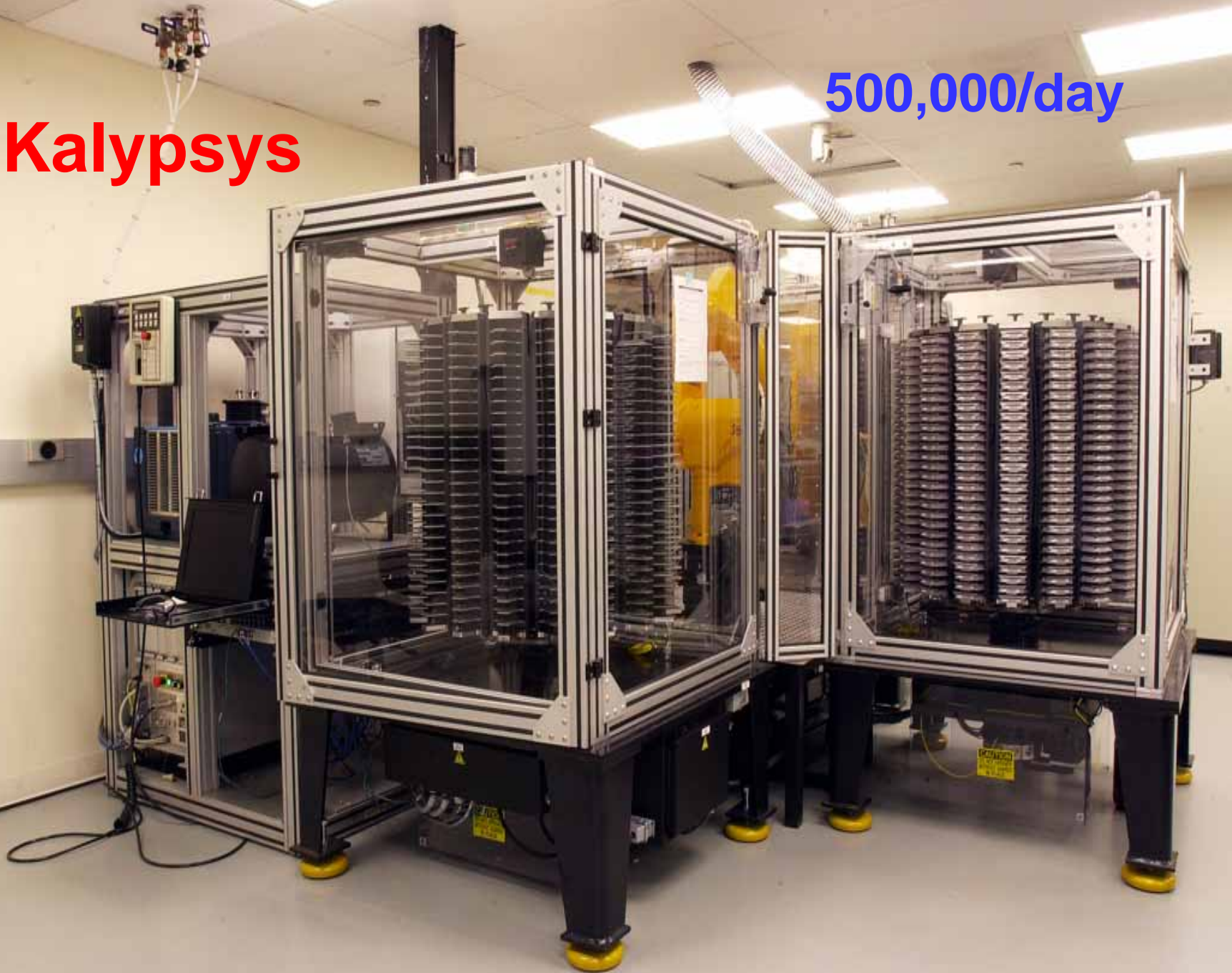
Traditional Chinese Medicine (TCM Pharmaceuticals)

- Huge competitive edge
- Glorious track records in statins, cordeceps, topos, etc
- Kalypsys screening systems
- HPLC fractions can be assayed
- New assays from RNAi
- Novel biological activities

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Kalypsys

500,000/day



Taiwan has joined Harvard-MIT Genome-wide RNAi Consortium

- RNAi and siRNA are revolutionizing biology at the moment. Applications in biomedicine will be immense. Products expected.
- Still no successful RNAi biotechs including Alnylam.
- Academia Sinica has world-leading, exciting small molecules functioning as RNAi. A new platform for drug discovery. Could be fully exploited in Taiwan.
- Synergizes with Taiwan's priority programs including hepatitis, hepatoma, HPV, cervical cancer, NPC, etc.

Gov has to be the leader

Capitals

Talents

Culture



Taiwan Government
BioTaiwan Authority

BioTaiwan
Mega
Fund



BOND

Government
Academia
Investors

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5 World-Class Pharmas/Biotechs in Taiwan



BioTaiwan

2034

Healthiest
& Happiest
People

Cleanest
Country
In the World

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