



# Growing the Semiconductor Industry Through Ecosystem Cooperation

## A Path Forward for China and the World

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**President & CEO**  
**December 13, 2012**



**SIA**  
SEMICONDUCTOR  
INDUSTRY  
ASSOCIATION

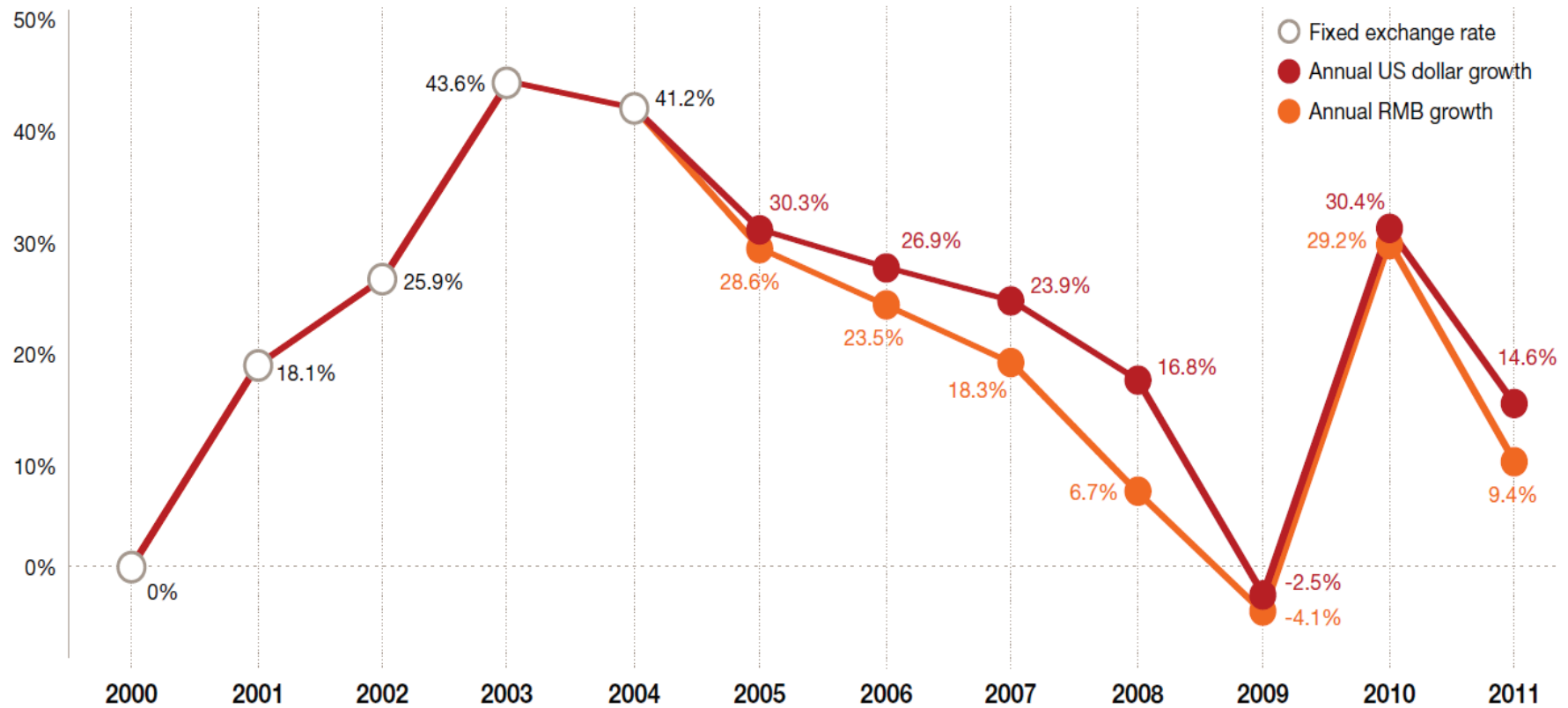
# Outline of Key Points

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- 1) Overview of the China semiconductor industry**
- 2) Need for global partnerships and cooperation**
- 3) Policy Recommendations**
- 4) Concluding Remarks**

# China's Semiconductor Market Growth 2000-2011

Annual growth



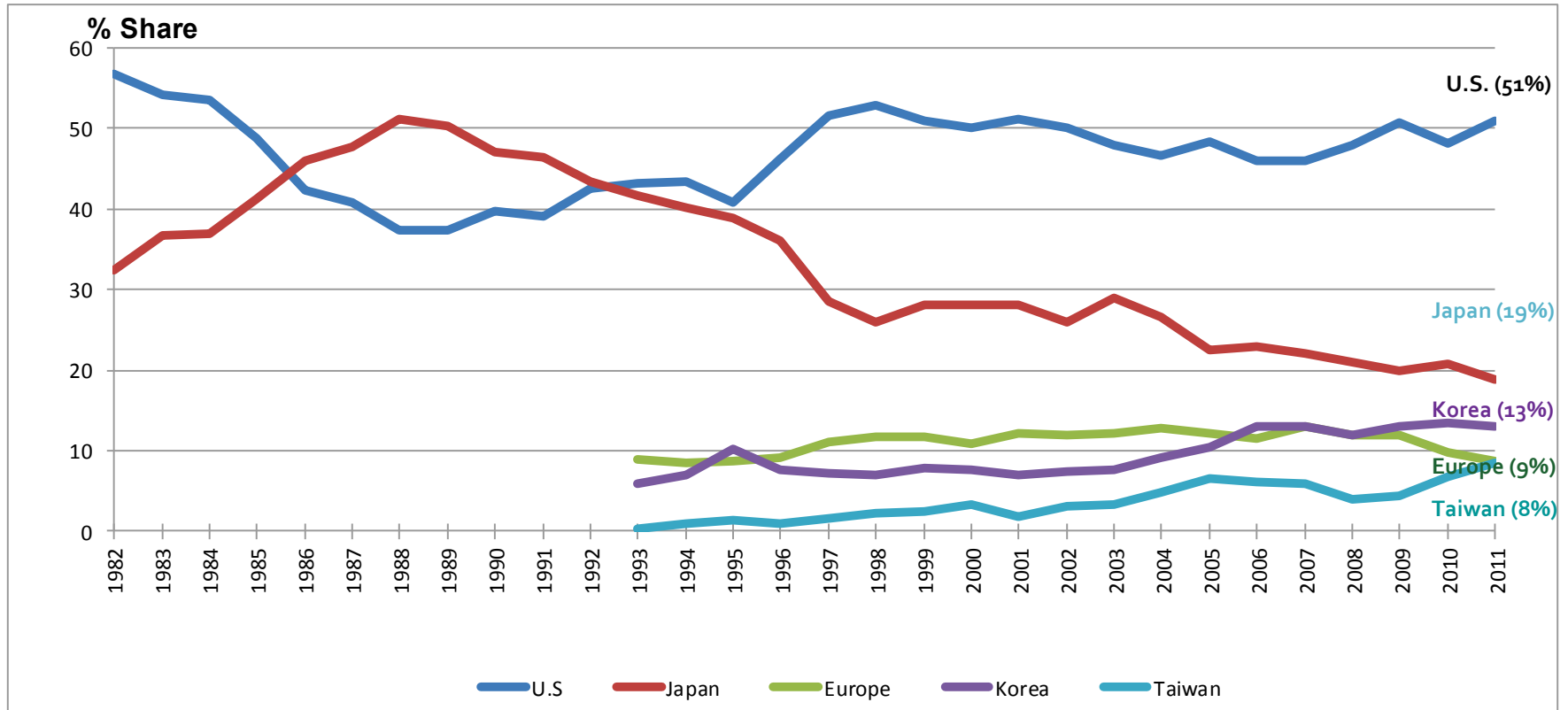
Market value

US\$bn	14.4	17.0	21.4	30.7	43.4	56.5	71.0	88.9	103.8	101.2	132.0	151.2
RMBbn	119.5	141.1	177.6	255.1	360.0	463.0	571.7	676.1	721.5	691.6	893.4	977.5

Note: Market reporting has changed since 2003 with sensors and optical semiconductors included as part of the optoelectronics-sensors-discrete (O-S-D) segment which along with integrated circuits (IC) make up the total semiconductor market.

Source: CCID, CSIA

# Worldwide Market Share by Region



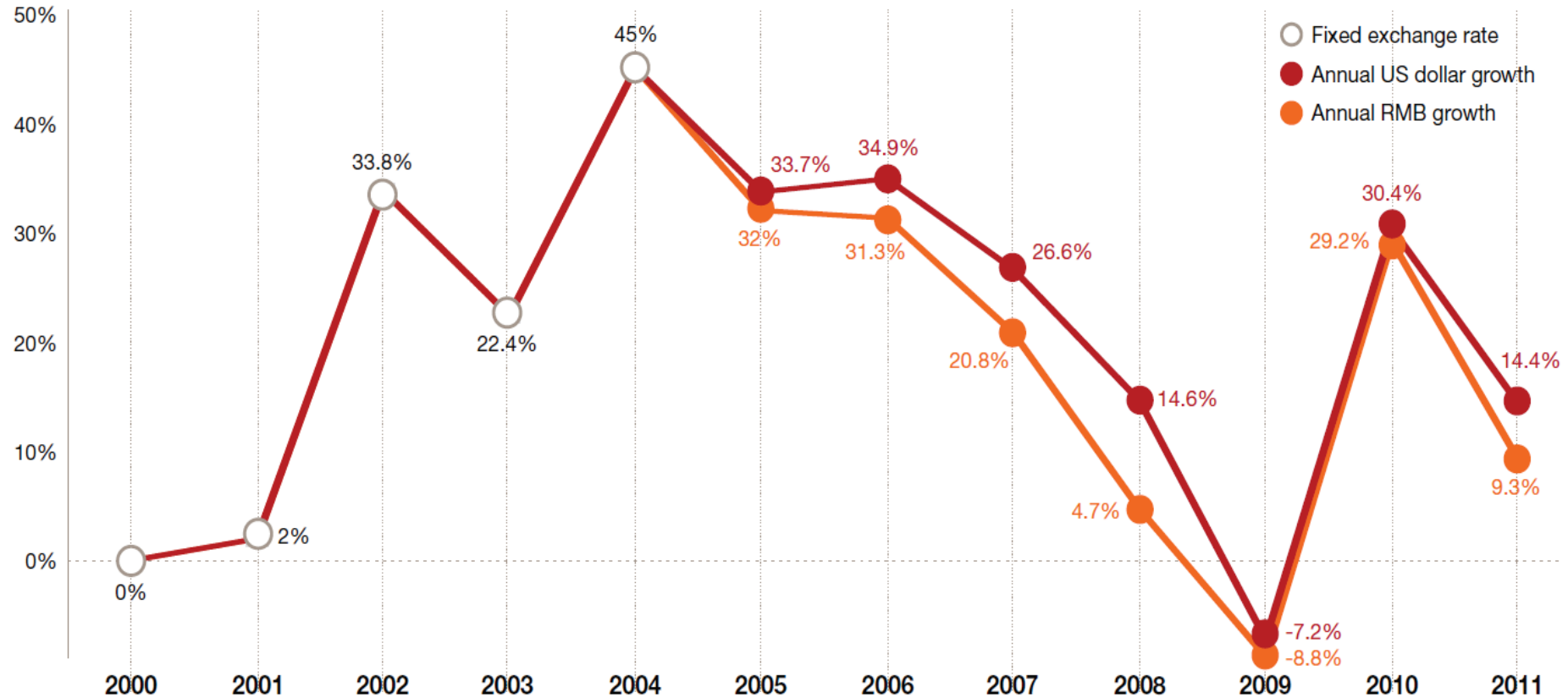
Source: SIA/iSuppli/WSTS

Note: Market share based on headquarters of seller, i.e. foundry output not in Taiwanese market share.

Numbers rounded

# China's Semiconductor Industry Revenue Growth 2000-2011

## Annual growth

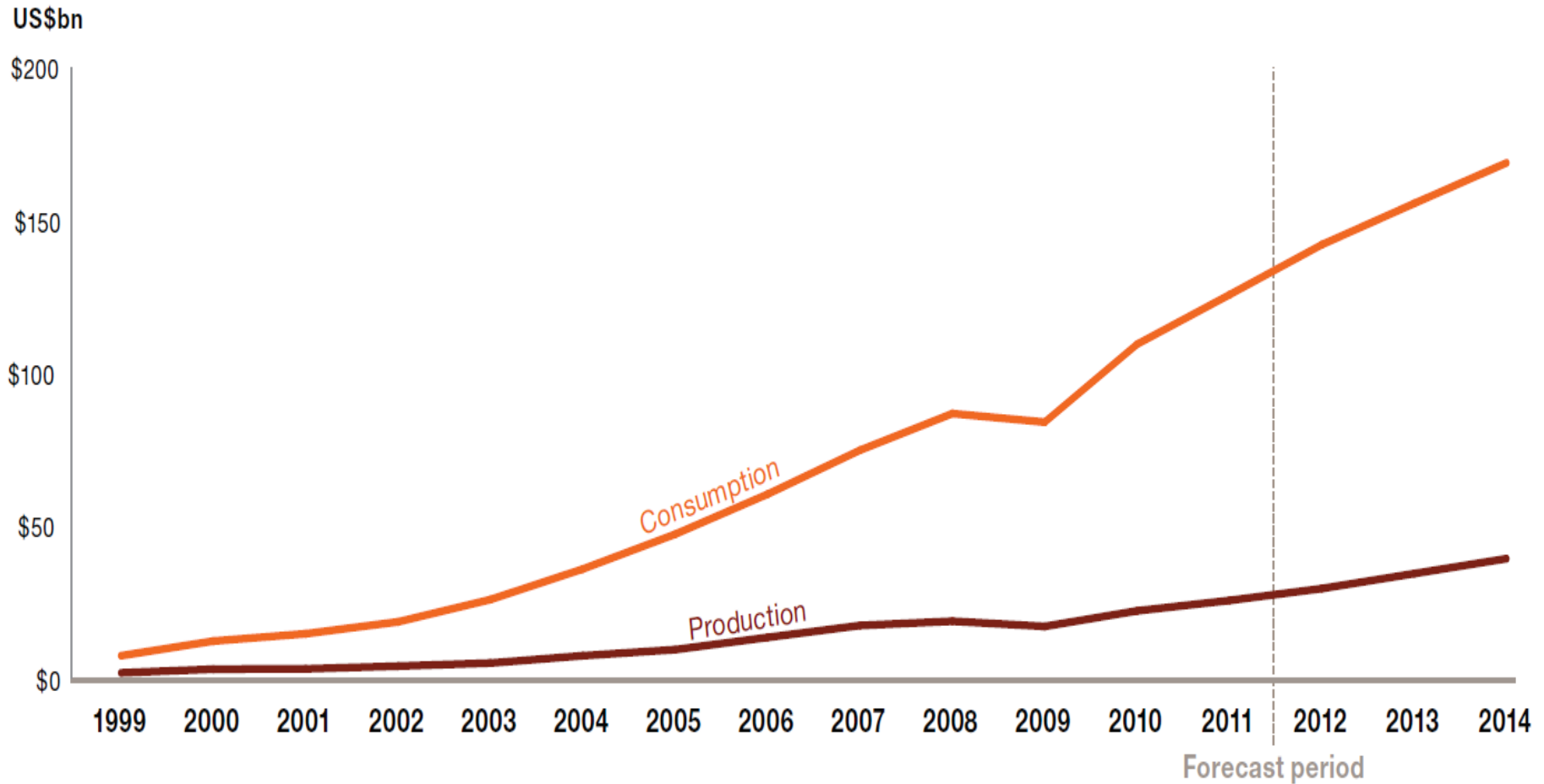


## Industry revenue

US\$bn	5.0	5.1	6.8	8.3	12.0	16.1	21.7	27.4	31.4	29.2	38.1	43.5
RMBbn	41.3	42.0	56.2	68.7	99.7	131.5	172.7	208.6	218.5	199.3	257.6	281.4

Source: CCID, CSIA

# China's IC Consumption versus Production 1999-2014



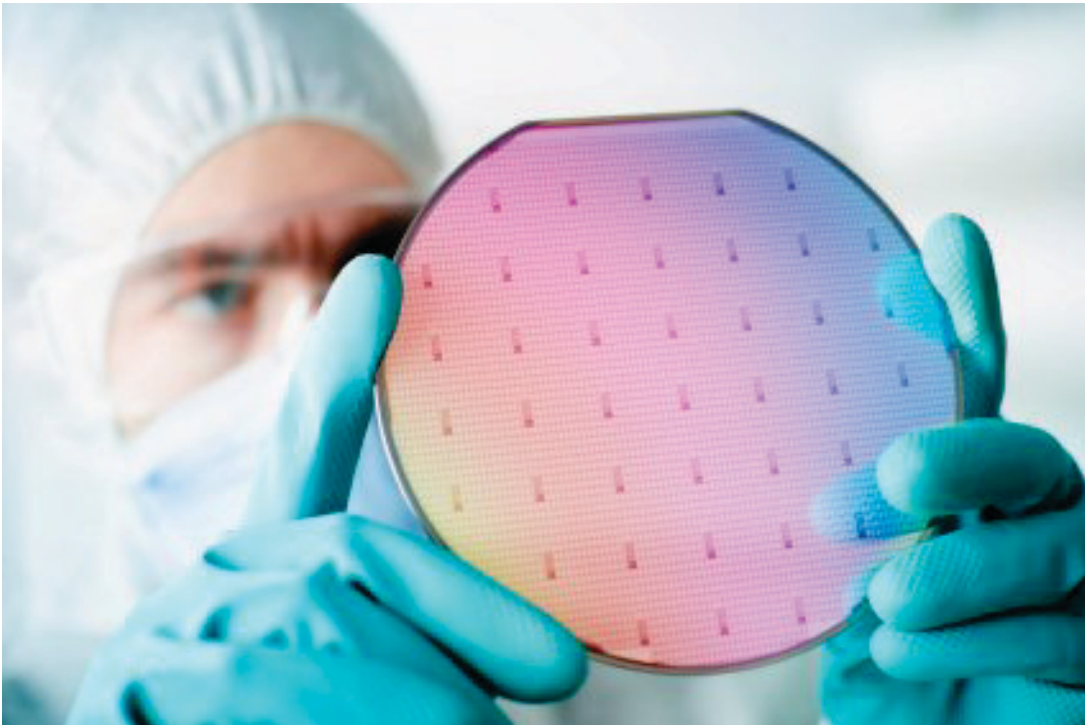
Actual annual average FX rates used for 1999–2011, and 2011 year-end FX rate used for forecast 2012–2014.

Source: CCID, CISA, PwC 2004–2012

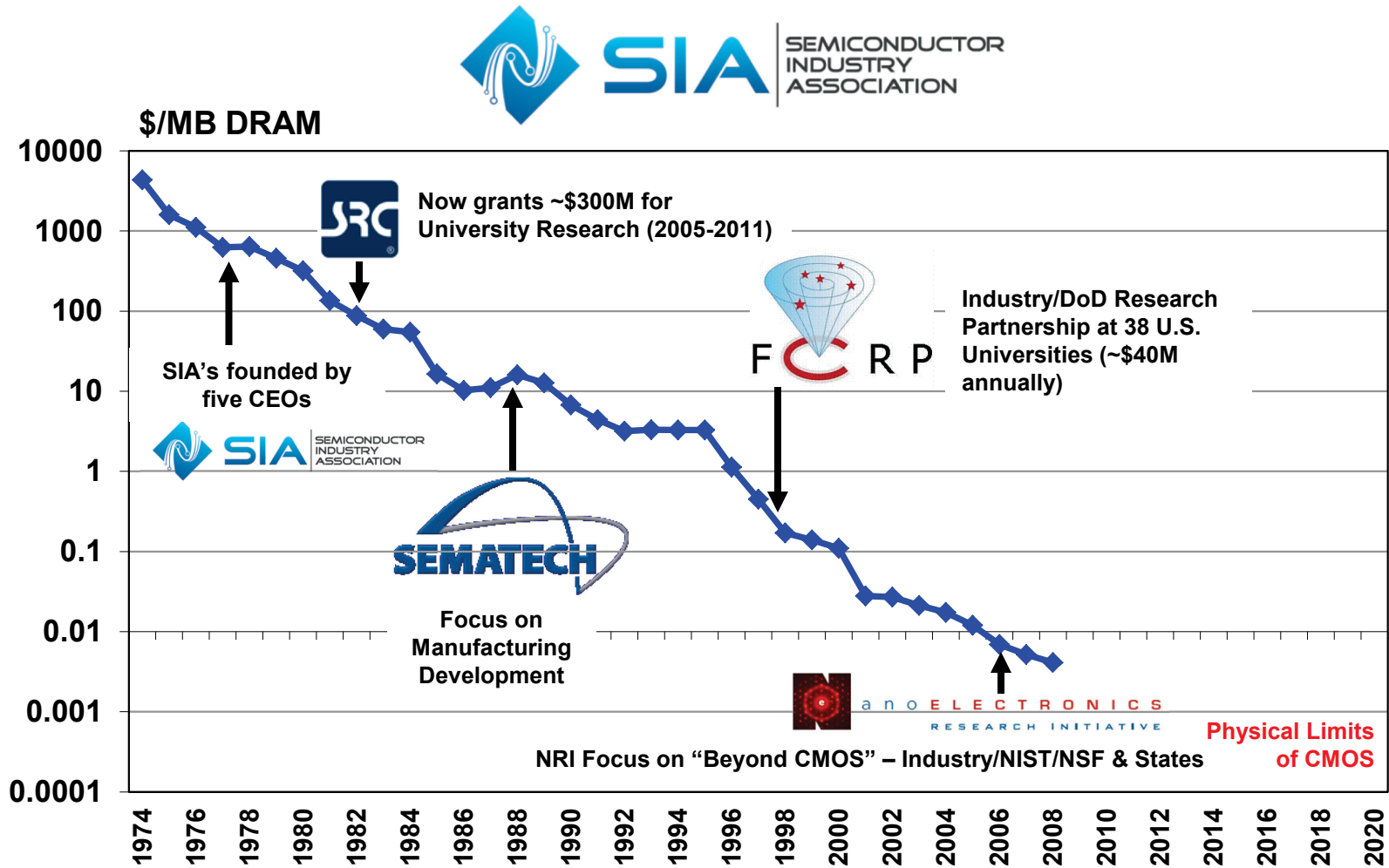


# Semiconductor Public-Private Partnerships

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# Industry consortia support for university basic research behind 10 fold drop in costs every six years



Source: DQ/Micron/WSTS



# Nanoelectronics Research Initiative (NRI) Funded Universities

Nanoelectronics • Architectures



★ Notre Dame  
 Illinois-UC  
 Michigan

Purdue  
 Penn State  
 UT-Dallas



★ SUNY-Albany  
 Purdue  
 Caltech  
 Yale

GIT  
 RPI  
 MIT  
 UVA

Harvard  
 Columbia  
 NCSU

**WIN** Western Institute of Nanoelectronics  
 ★ UC Los Angeles  
 UC Berkeley  
 UC Irvine  
 UC Santa Barbara  
 Stanford  
 U Denver  
 Portland State  
 U Iowa



★ UT-Austin  
 UT-Dallas  
 U. Maryland

Rice  
 ASU  
 NCSU

Texas A&M  
 Notre Dame  
 Illinois UC



Columbia  
 Harvard  
 Purdue  
 UVA  
 Yale  
 UC Santa Barbara  
 Stanford  
 U. Mass  
 U. Arkansas  
 U. Oklahoma  
 Notre Dame  
 U. Nebraska/Lincoln  
 U. Maryland  
 Cornell  
 UT Austin  
 Caltech



**35 Universities in 20 States**

# Worldwide Technology Cooperation Drives Innovation



Global 450 Consortia

September 2011 - New York Governor Andrew M. Cuomo announced the establishment of the Global 450 Consortium (G450C) at CNSE's Albany NanoTech Complex. This \$4.8 billion, first-of-its-kind collaboration headquartered and housed at CNSE is comprised of five leading international companies working to create the next generation of computer chip technology: **IBM, Intel, GlobalFoundries, Samsung and TSMC.**

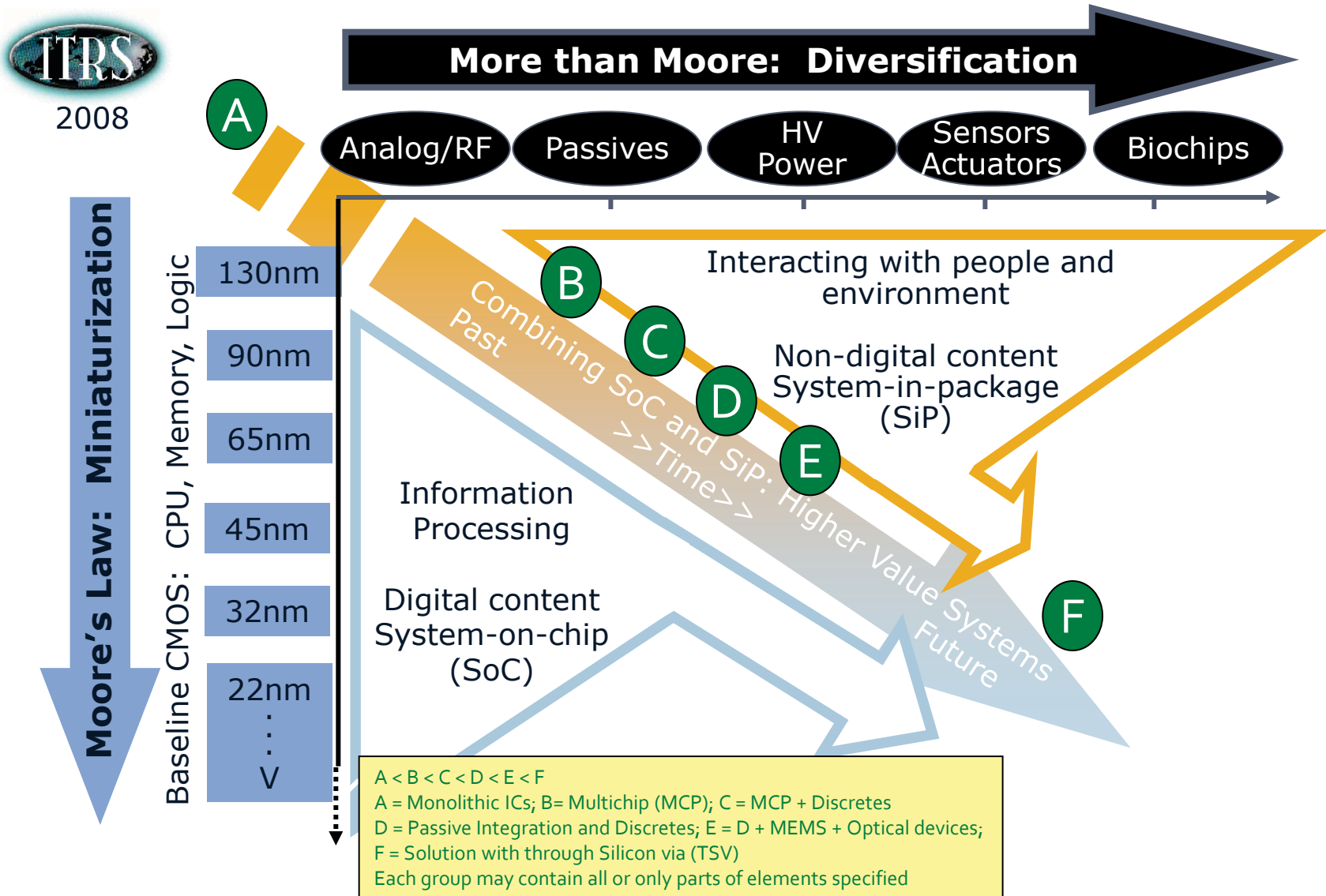
"The development of 3D integration technology is at an inflection point." – January 2012



## SEMATECH 3D Enablement Center Members and Partners



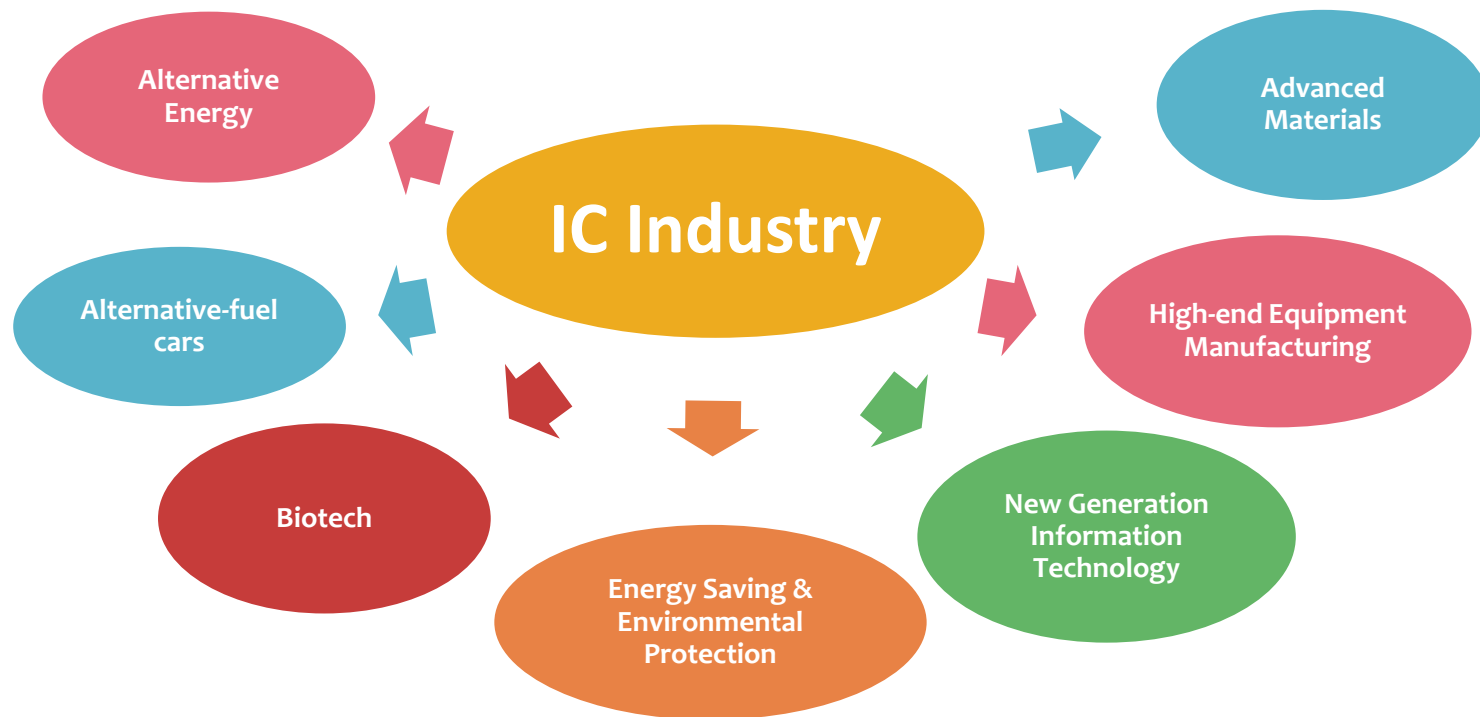
# Semiconductor technology roadmap - ITRS



# Strategic Emerging Industries and 12<sup>th</sup> Five Year Plan (FYP) for Development of Integrated Circuits (IC) Industry

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Released in February 2012, 12<sup>th</sup> FYP for IC sector identifies ICs as “core” and “foundation” in developing strategic emerging industries, key to transforming China’s economic structure and growth pattern



# 12<sup>th</sup> Five Year Plan (FYP) for Development of Integrated Circuits (IC) Industry

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Tax/Policy incentives to apply to key IC design/manufacturing firms included in State's industry layout plans. 12<sup>th</sup> FYP for the IC Industry identifies three priority areas for technical innovation:

## Chip Design:

Priorities: CPU/DSP/DRAM, SoC, network communication, digital TV, smart grid, information security, auto electronic, bank IC/RFID, numerical/industrial control, smart sensor

## Chip Manufacturing:

Priorities: Expand 12" advanced process mfg capacity & 8"/6" specialty process mfg lines; Accelerate R&D and application of 45nm, 32nm mfg process; gradually introduce 28nm process; Develop specialty process technology, i.e. high voltage, analog, analog/digital, MEMS, RF, power device, and SiGe

## Packaging & Testing:

Priorities: Enter international mainstream and above levels of flip chip bonding, BGA, chip scale package and multi-chip modules, WLP, 3D and Through Silicon Vias; Strengthen development efforts for new-type packaging & testing IC products, i.e. multi-chip packages, SiP, package in package, package on package, especially high-density

# Semiconductor-Enabled Future Requires Smart Policies

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## ❖ Intellectual Property Protection

- Enhanced IP rights
- Anticounterfeiting

## ❖ Free & Open Markets

- ITA Expansion
- Encryption

# The World Semiconductor Council

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- ❖ Comprised of the semiconductor industry associations in the United States, Korea, Japan, Europe, China and Chinese Taipei
- ❖ A cooperative body that promotes semiconductor industry activities worldwide.



# Intellectual Property Protection

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# Anti-Counterfeiting

## Legitimate Chips

- Clean rooms
- Tested for Quality/Reliability



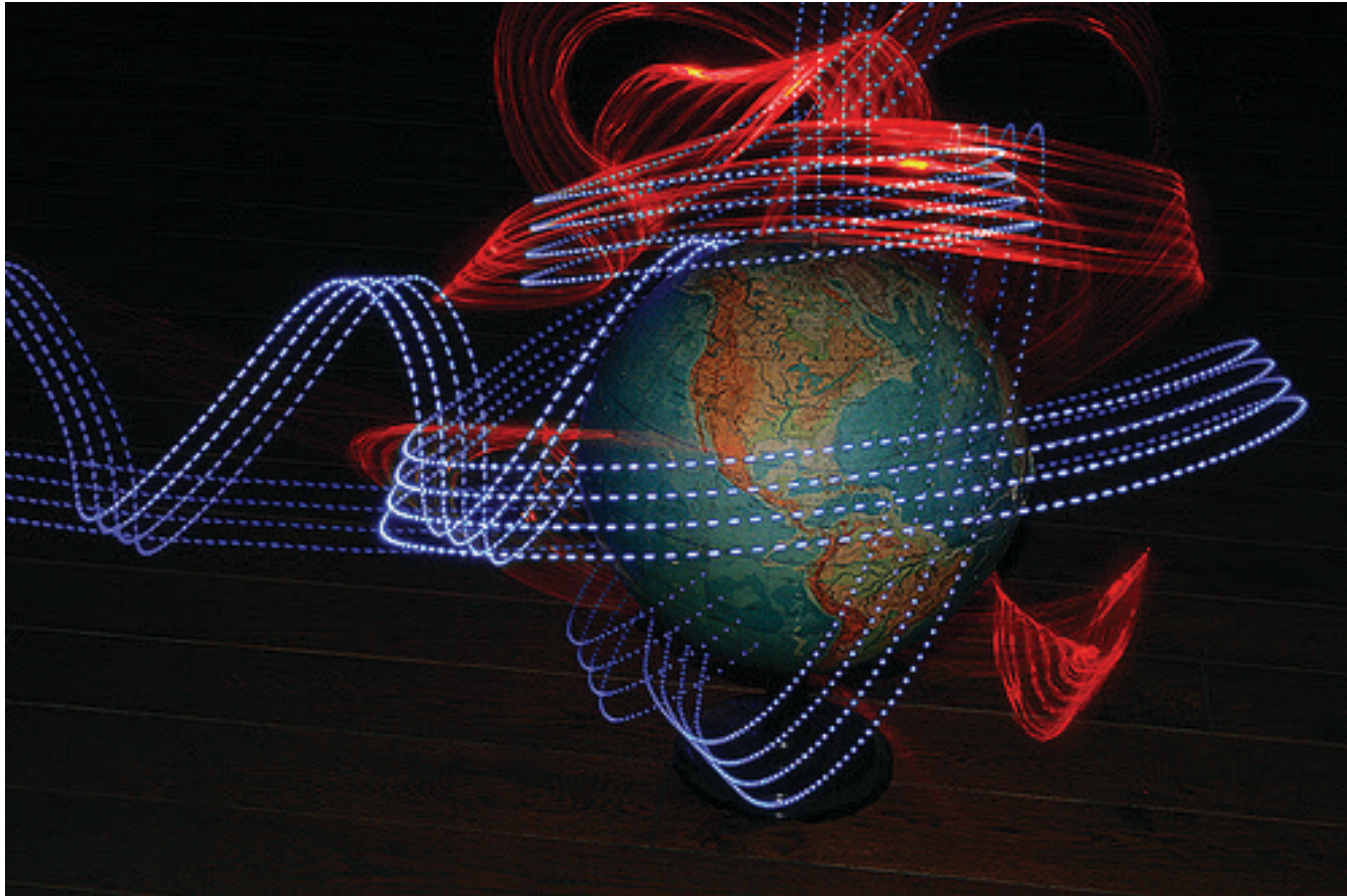
## Counterfeit Chips

- Chemical corrosion
- Dirt & dust
- Cracking/Melting



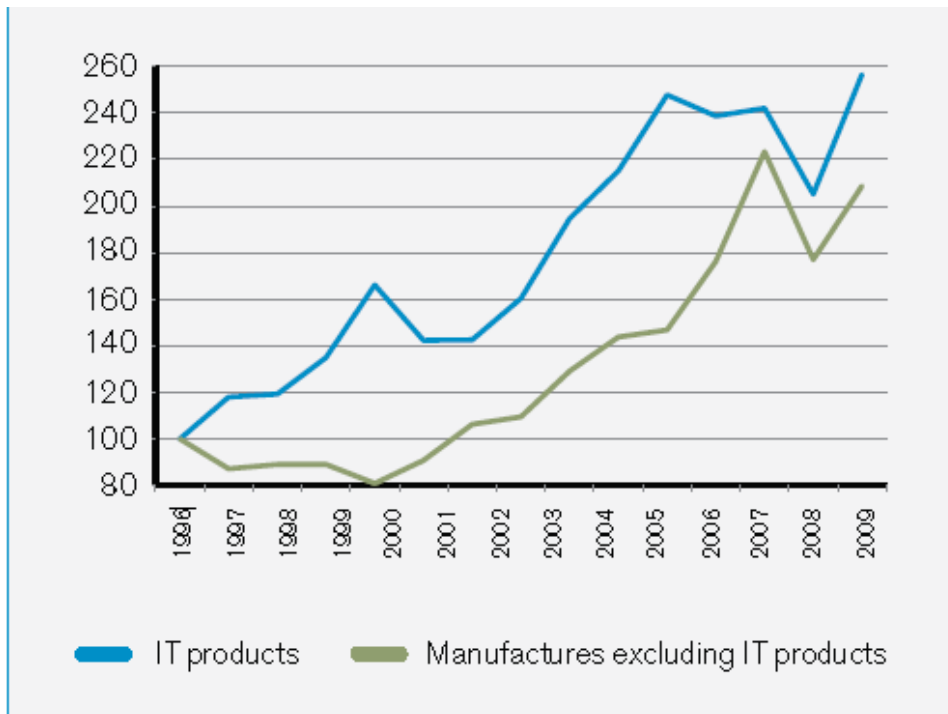
# Free & Open Markets

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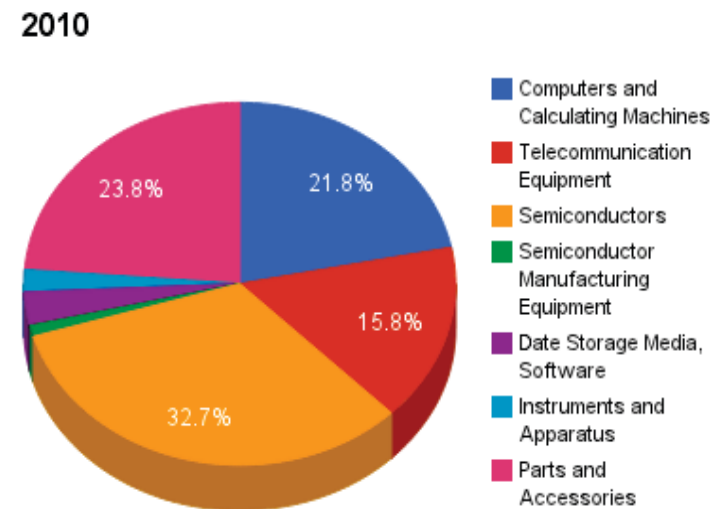


# Information Technology Agreement (ITA)

The Expansion of global exports of IT products and other manufactures



World Exports of IT Products



Source: WTO Secretariat, based on UN Comtrade



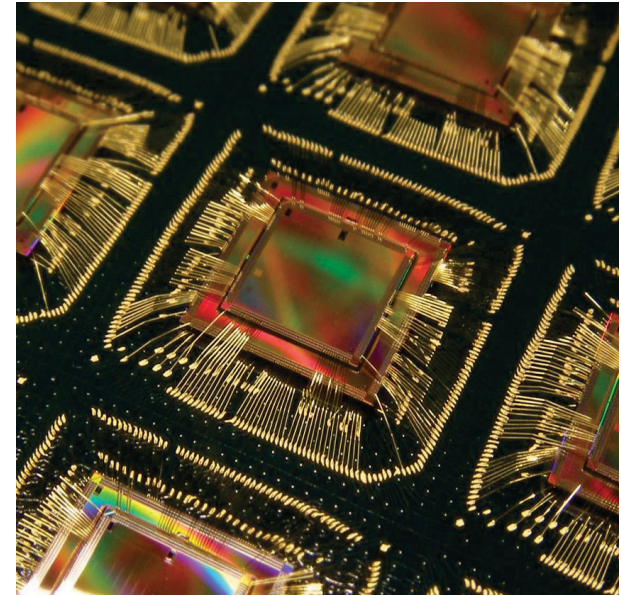
# Tariff Free Treatment for New Semiconductor Products

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## Multi-Component Semiconductors (MCOs) & Multi-Chip Packages (MCP)

Semiconductors are an industry of rapid technological development, enabling such societal challenges, consumer and business needs as:

- Increased performance
- Ultra miniaturization
- Energy saving in cars, PCs, home electrical appliances and electronic equipment
- Cost saving



As a result, a diverse range of high-functional super-high density packaged products - incorporating combinations of integrated circuits and discrete components - has been emerging as an 'integrated circuit' configuration and has been in high demand in recent years.

# WSC Encryption Principles & Best Practices

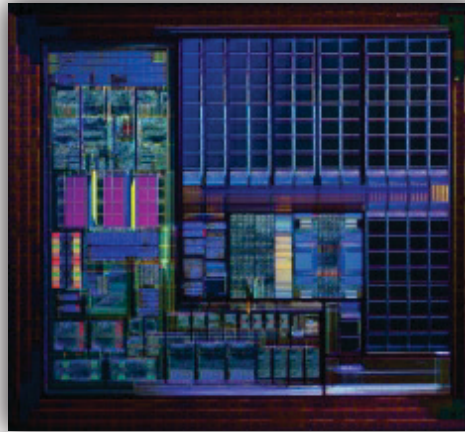
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- No regulation of cryptographic capabilities in widely available products used in the domestic commercial market as a general matter except in narrow and justifiable circumstances
- Regulations should not directly or indirectly favor specific technologies, limit market access, or lead to forced IP transfer
- Adoption of international security standards, including normative algorithms, rather than and instead of technology mandates
- The regulatory procedures related to the notification, evaluation, approval or licensing of goods containing encryption technology should be transparent, predictable and consistent with international norms and practices, and not burdensome.

# Semiconductors Enable Solutions to Global Challenges

## ENERGY SOLUTIONS 能源解决方案

- Enabling alternate energy sources
- 实现替代能源
- Energy-efficient homes and vehicles
- 提高家庭和汽车能效
- Fuel-efficient transportation
- 提高交通运输能效
- Smart infrastructure



## AGING POPULATIONS 老龄人口

- Fewer workers to support retired people
- 减少老年人的护理人员
- Improved productivity is the solution
- 提高效率是解决方案

## HEALTH CARE 保健

- Technology drives advances in medical science
- 技术推动医学发展
- Diagnostic tools
- 诊断工具
- Tools for minimally-invasive surgery
- 微创手术
- IT lowers cost of delivery of health care
- 信息技术降低了保健成本