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**Toray Group IT-related Products Segment  
and  
Strategies for Electronics & Information Materials  
Division**

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**Toray Industries, Inc.**

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# I. Operation Review and Forecast of Toray Group IT-related Products Segment

# The Importance of IT-related Products Segment to Toray



IT-related Products Segment playing an important role in the attainment of an "offensive" management

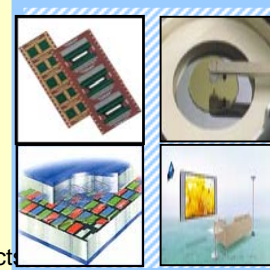
IT-related Products Segment is the bottom line of Toray's Advanced Materials Businesses

## Main "Project NT-II" Action Points

Management Issues	Projects
Developing innovative attitudes and ideas / Reinforcing corporate structure (from the "defensive" perspective)	1. Activating corporate culture
	2. March/2005 : Strengthening cost competitiveness (TC Project) March/2006 and beyond : Promoting self-improvement efforts
	3. Strengthening financial structure
Expanding revenues and profits through business structure reform (from the "offensive" perspective)	4. Promoting marketing innovation
	5. Improving profitability by product
	6. Expanding advanced materials businesses
	7. Expanding No.1, only 1, first1 businesses
	8. Expand businesses outside Japan

## IT-related Products

<Segment on Consolidated Basis>  
-IT-related Products



**Circuit and Semiconductor Materials:** Circuit Materials, Electronics Resins & Films, Capacitor Films, Release Films, IC packaging-related Materials, IC packaging / mounting Equipment, Electro-Chemical Products, etc.

**Display Materials:** Optical PET Films, LCD Color Filters, Color Filter Materials /Equipment, PDP Materials, Organic EL Materials, etc.

**Data Storage Materials:** Data Storage Films, Printing Material, etc.

**Software/Others:** CAD software, system development, etc.

## Environment, Safety, and Amenity



## Life Sciences



Many "No.1" IT-related Products

Businesses	Market Share
Chemicals	•DMSO 44%
Carbon Fibers	•Carbon Fiber Composite Material 37%
Medical Products	•Blood Purification Device for Treating Septicemia 100%
Electronics	•Polyimide Adhesive Tape for TAB 81%
	•Photosensitive Relief Printing Plate 37%
LCD Materials	•Slit Coater for LCD Color Filter (5G or larger) 75%
Toray Engineering	•LCD Driver IC Bonding Equipment 40%
	•Marking Equipment for LCD panel 70%

## Strategic Expansion of IT-related Products Businesses (existing production bases)

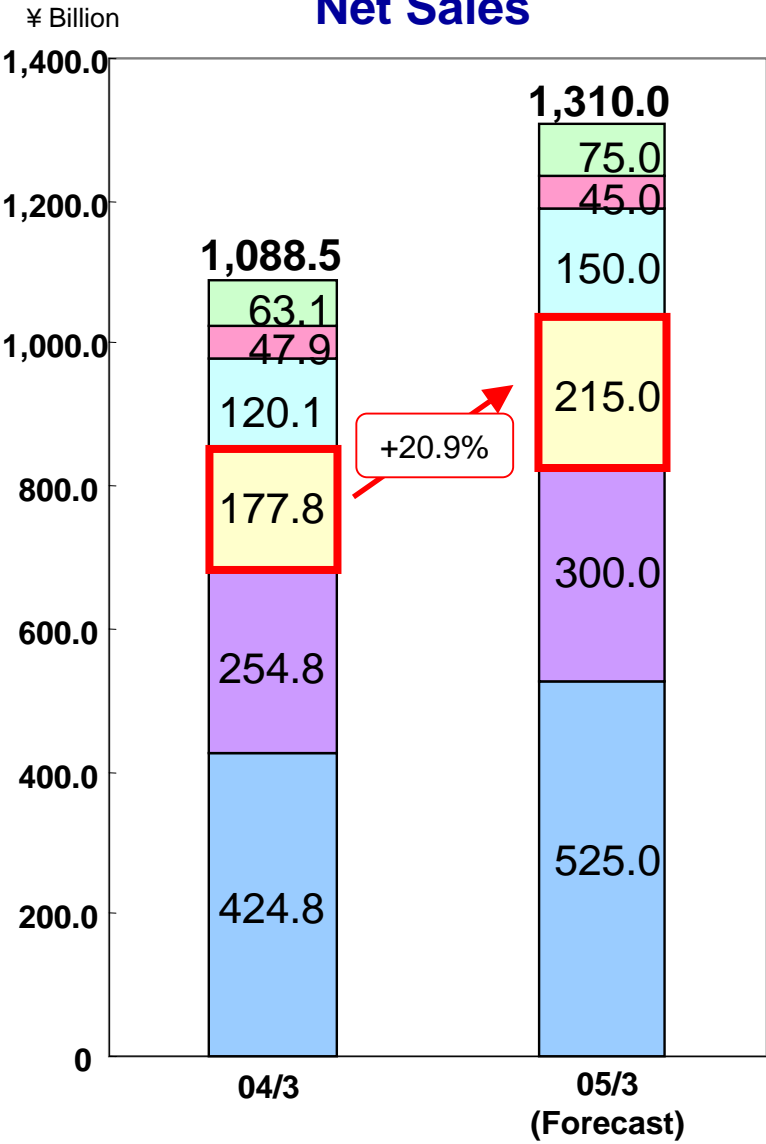


Businesses	Market Share
Fibers and Textiles	•Polyester-Cotton Blended Textile 30%
	•Polyester Taffeta 21%
	•Man-made Suede 32%
	•Nylon Filament Yarn for Fishing Net 21%
	•Fluorofiber 39%
	•Polyester Staple Fiber for Sewing Thread 28%
	•Polyester-Rayon Blended Textile 12%
Plastics	•PET Film 19%
	•OPP Film for Capacitor 14%
	•Para-Based Aramid Film 90%
	•PPS Film 100%
	•PE Film for Protection 43%

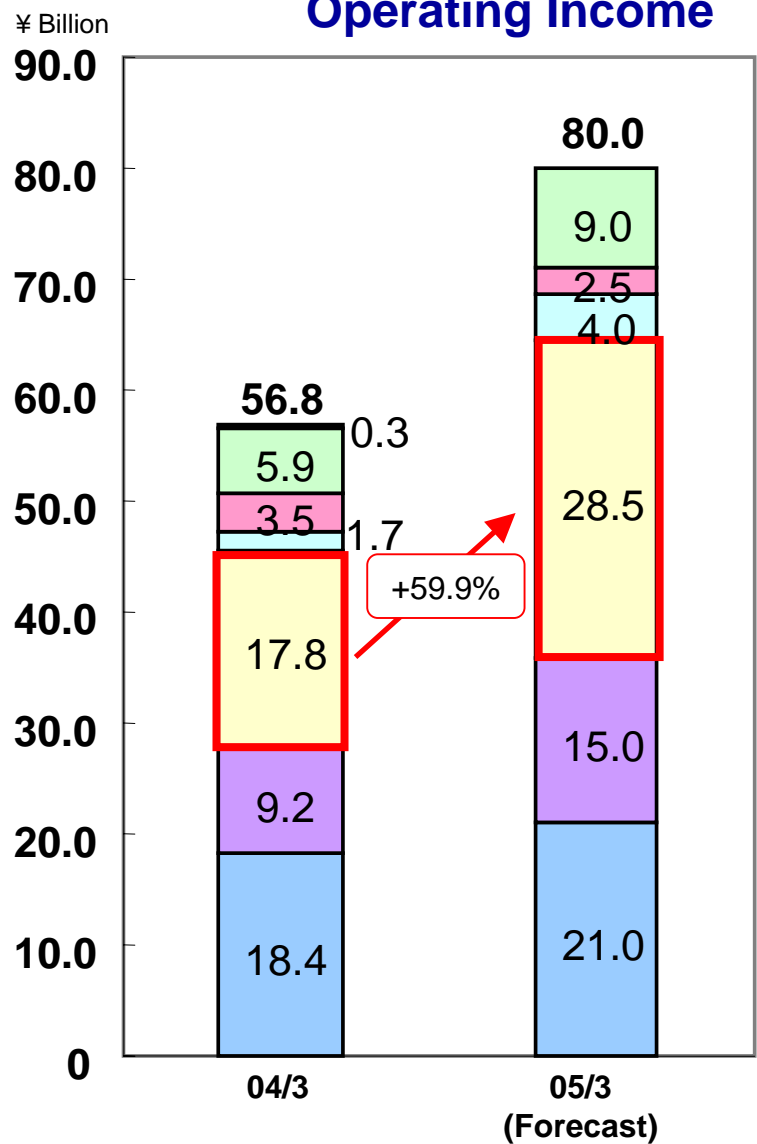
Total 31 Businesses (Mar/04 Sales: ¥ 282.2 billion, Operating Income: ¥ 37.5 billion)

# Business Forecast of Toray Group by Segment

## Net Sales



## Operating Income

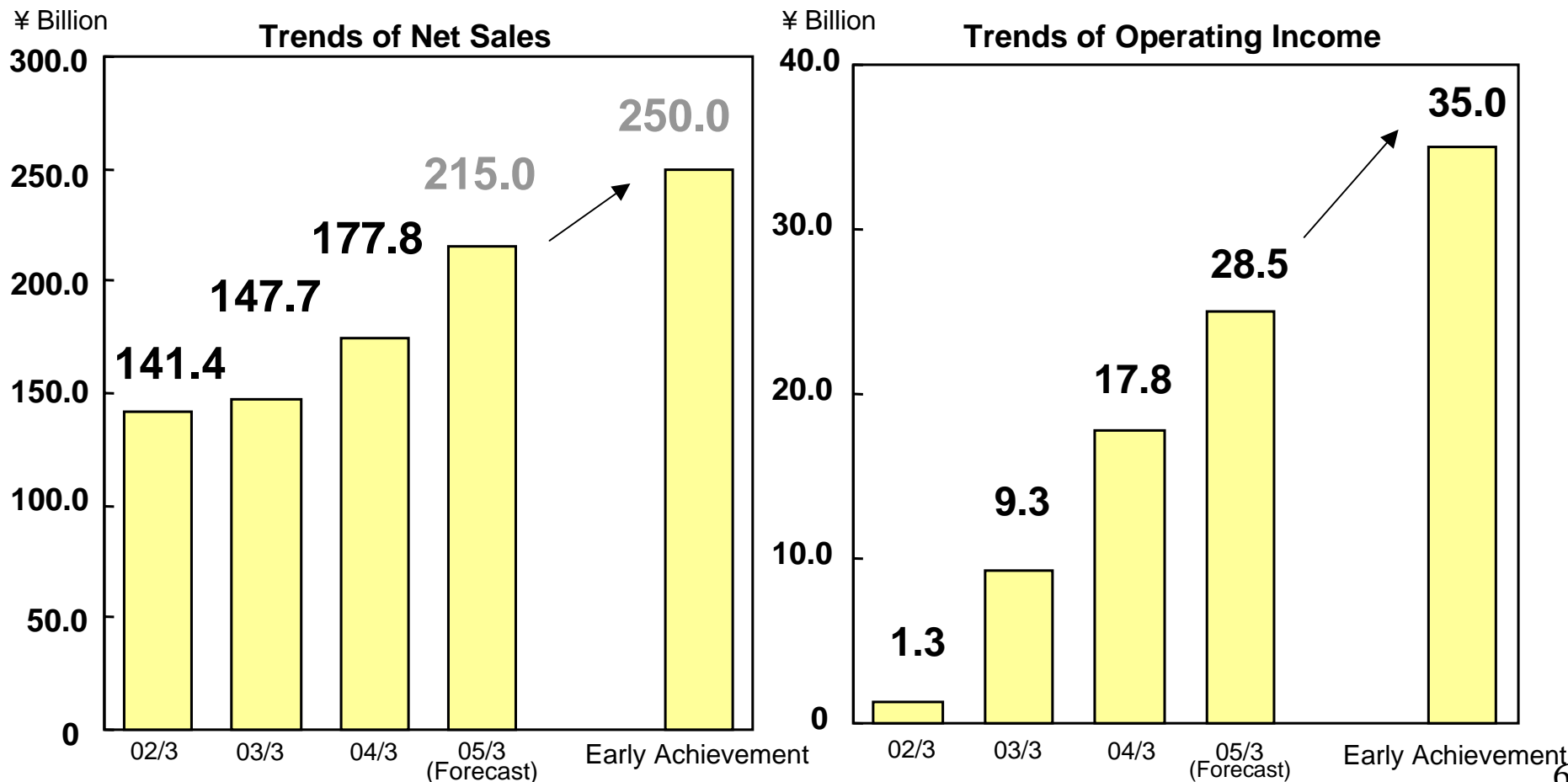


- Adjustment
- New Products, others
- Pharmaceuticals & Medical Products
- Housing & Engineering
- **IT-related Products**
- Plastics & Chemicals
- Fibers & Textiles

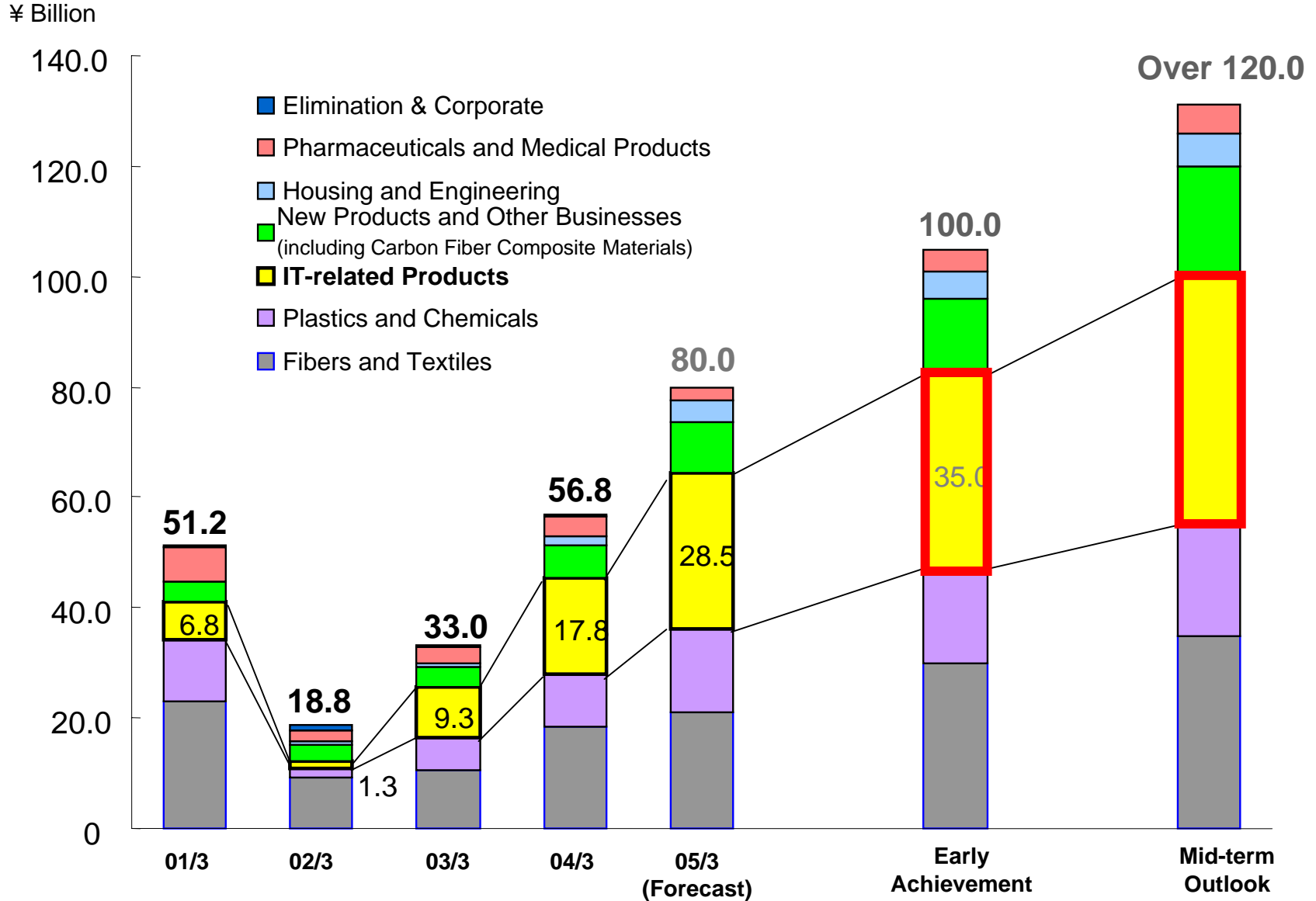
# Income Increase of Toray Group IT-related Products Segment

## <Business Environment>

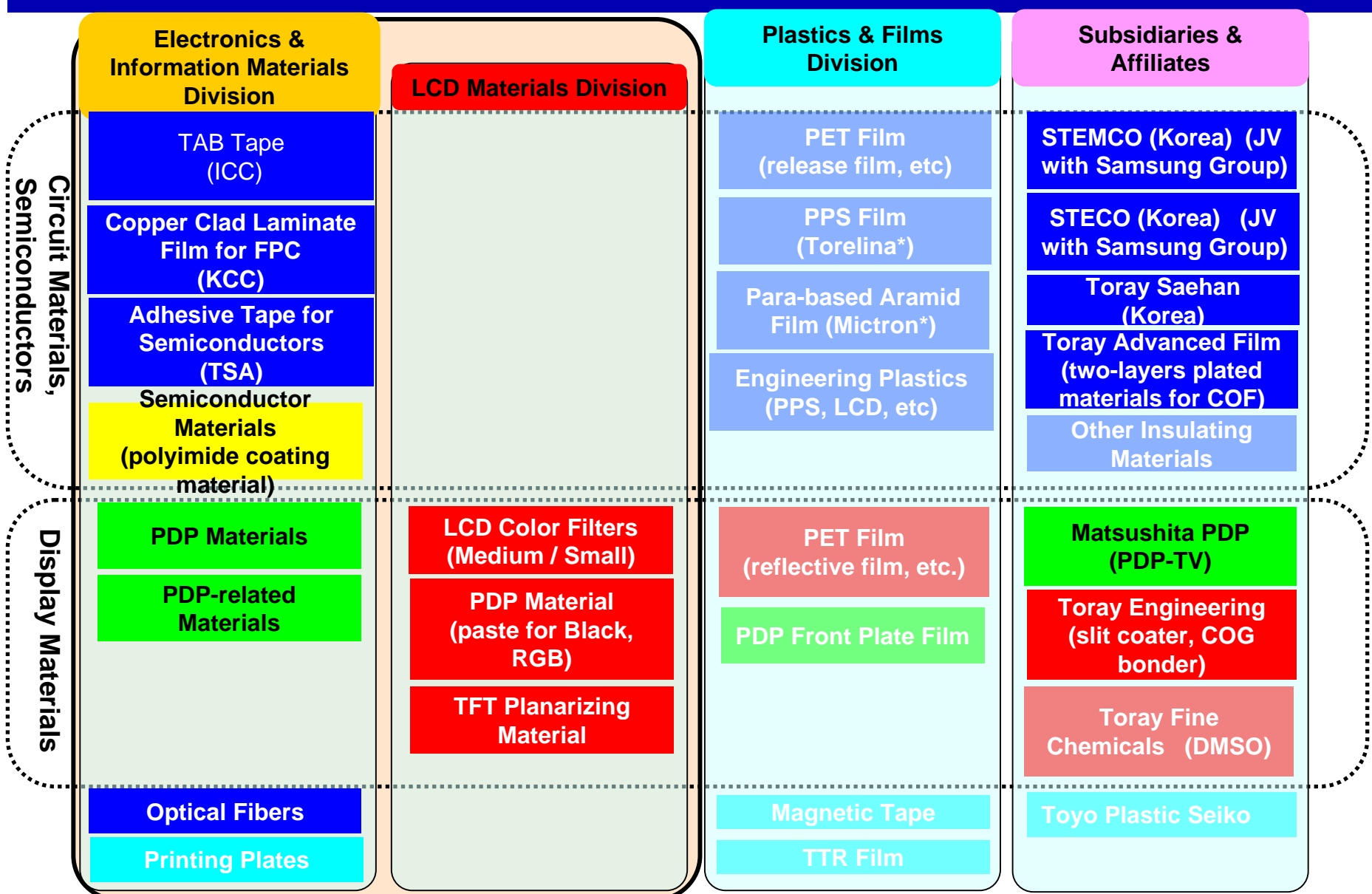
- Although the electronic information industry is in a temporary downward phase, PC and mobile phones are continuously growing and dramatic expansion is expected in the digital consumer electronics businesses. Above all, high growth of 12% per annum is expected in electronic components (semiconductors, printed circuit board materials, FPD).
- Regionally, China, Taiwan, and Korea are expected to expand dramatically.



# Operating Income Forecast by Toray Group Business Segment



# Major IT-related Products by Division





\* ICC = IC Chip Carrier Tape    KCC = [Kapton] Copper Clad    TSA = Toray Semiconductor Adhesive



# Breakdown by Application of IT-related Products





## Flat Panel Display (FPD) Materials

**<Product Examples>**

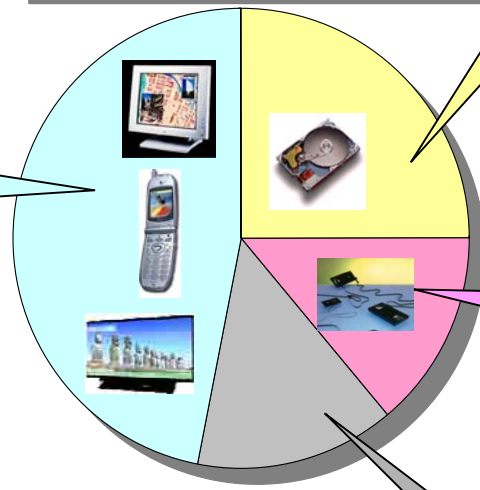
- Circuit Materials (TAB tape)** (ICC 81%) 
- Circuit Materials** (two-layers plated materials for COF) 
- PDP Material** (paste for rear panel) 
- LCD Color Filters** (specifically medium/small 20%) 
- Paste Materials for LCD Color Filters (Black, R-G-B)** 
- LCD Color Filter Manufacturing Equipment** (Slit Coater 43%, Marking Machine 70%, etc.) 
- IC Bonding Device for LCD 40%** 
- PET Film 19%** (reflective film, etc.)

## Other Digital-related Products Material

**<Product Examples>**

- Circuit Materials (FPC Copper clad Laminate Film (KCC))** 
- Semiconductor-related Materials (polyimide coating)** 
- PET Film 19%** (release film, etc.)
- Magnetic Tapes**
  - <Product Examples>**
  - PET Film 19%**
  - Para-based Aramid Film 90%** 
- Other IT Products**
  - <Product Examples>**
  - PET Film 19%** (thermal transfer ribbon, etc.)
  - Printing Plates 37%** 
  - Software**

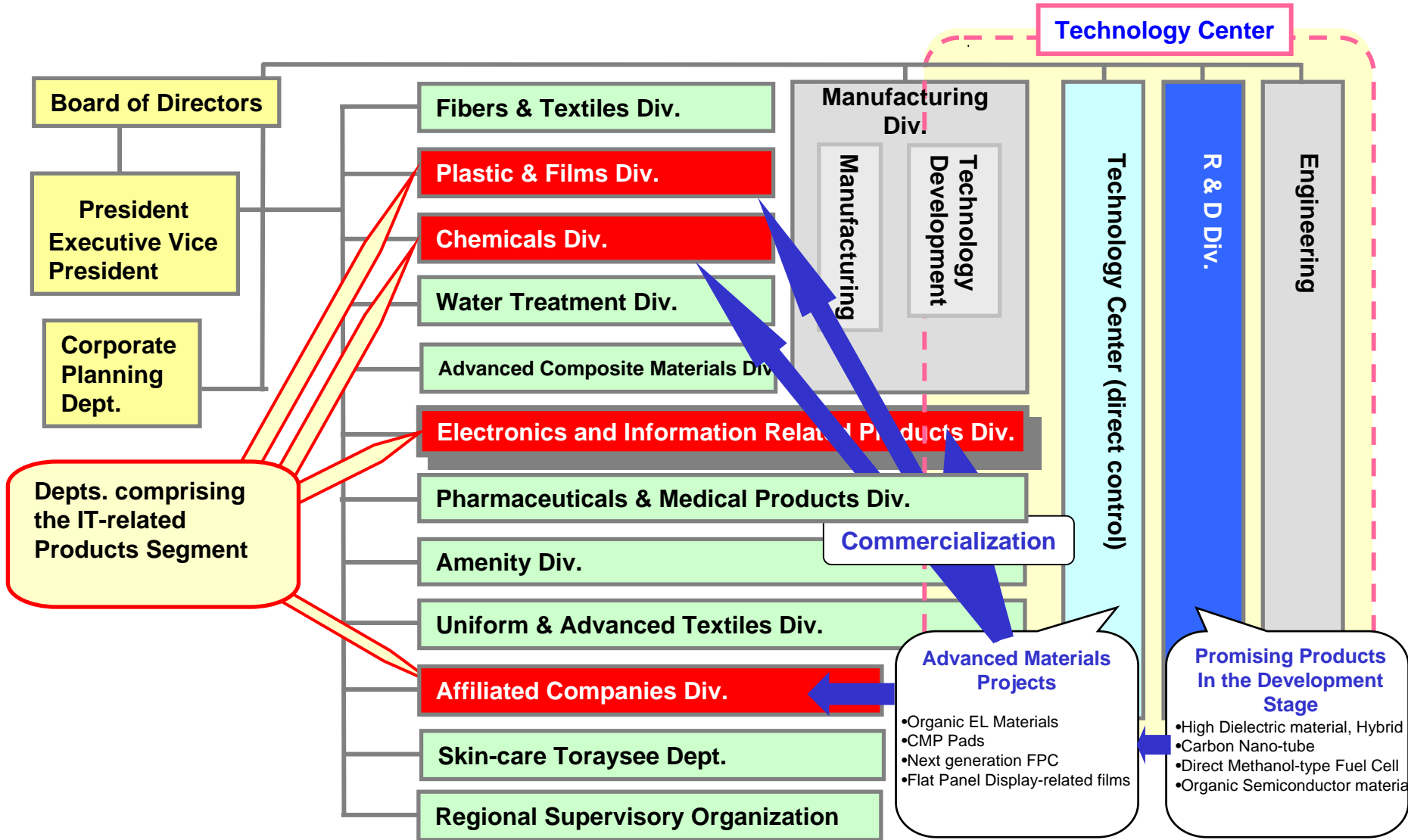
**Net Sales of IT-related Products: ¥ 215.0 Billion (FY Mar/05)**



**No.1 World market share products**

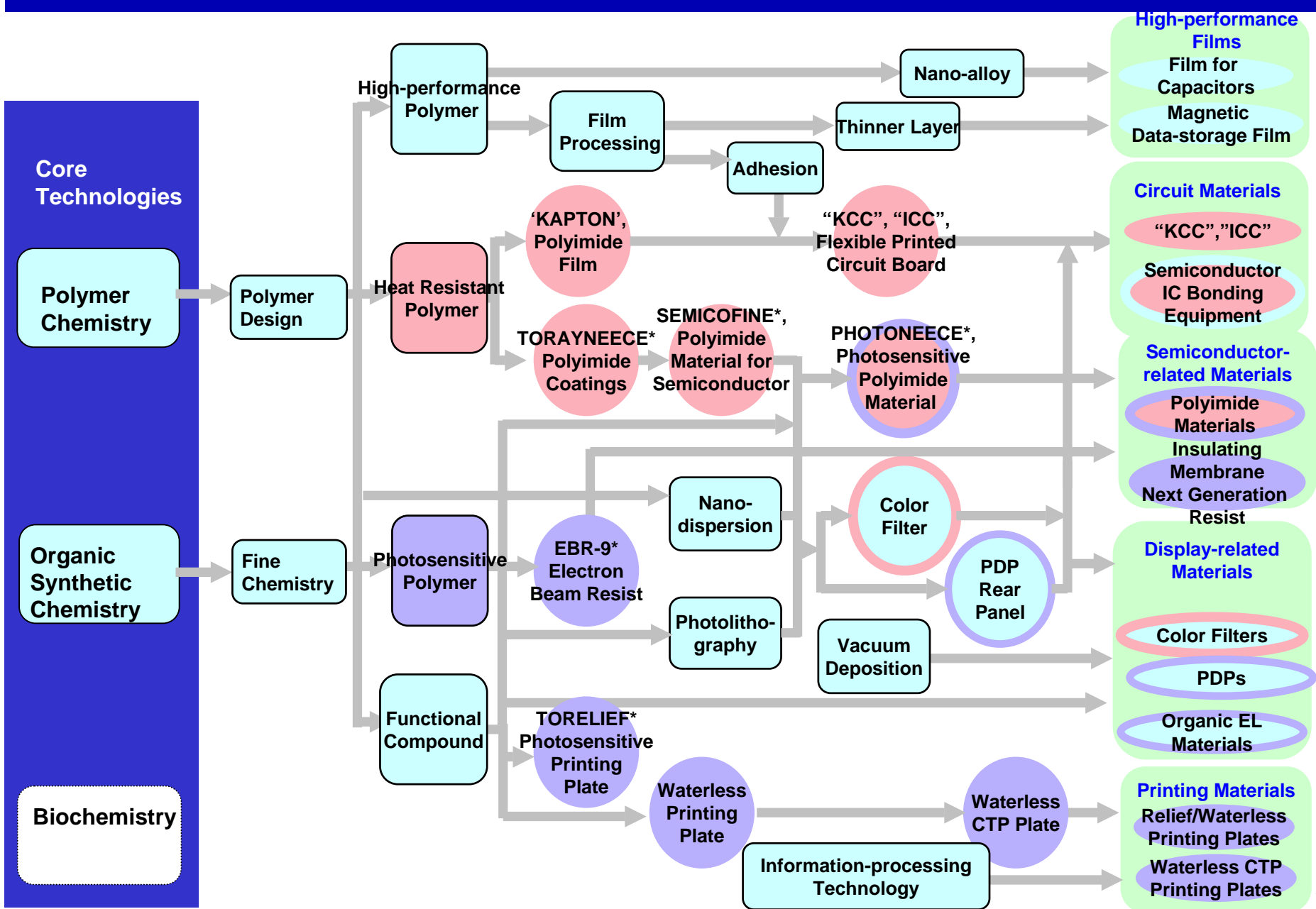
% shows world market share (Toray estimate)  
(PET Film share is the total PET film market share, not the market share by application.)

# Toray Organization Involved in IT-related Products

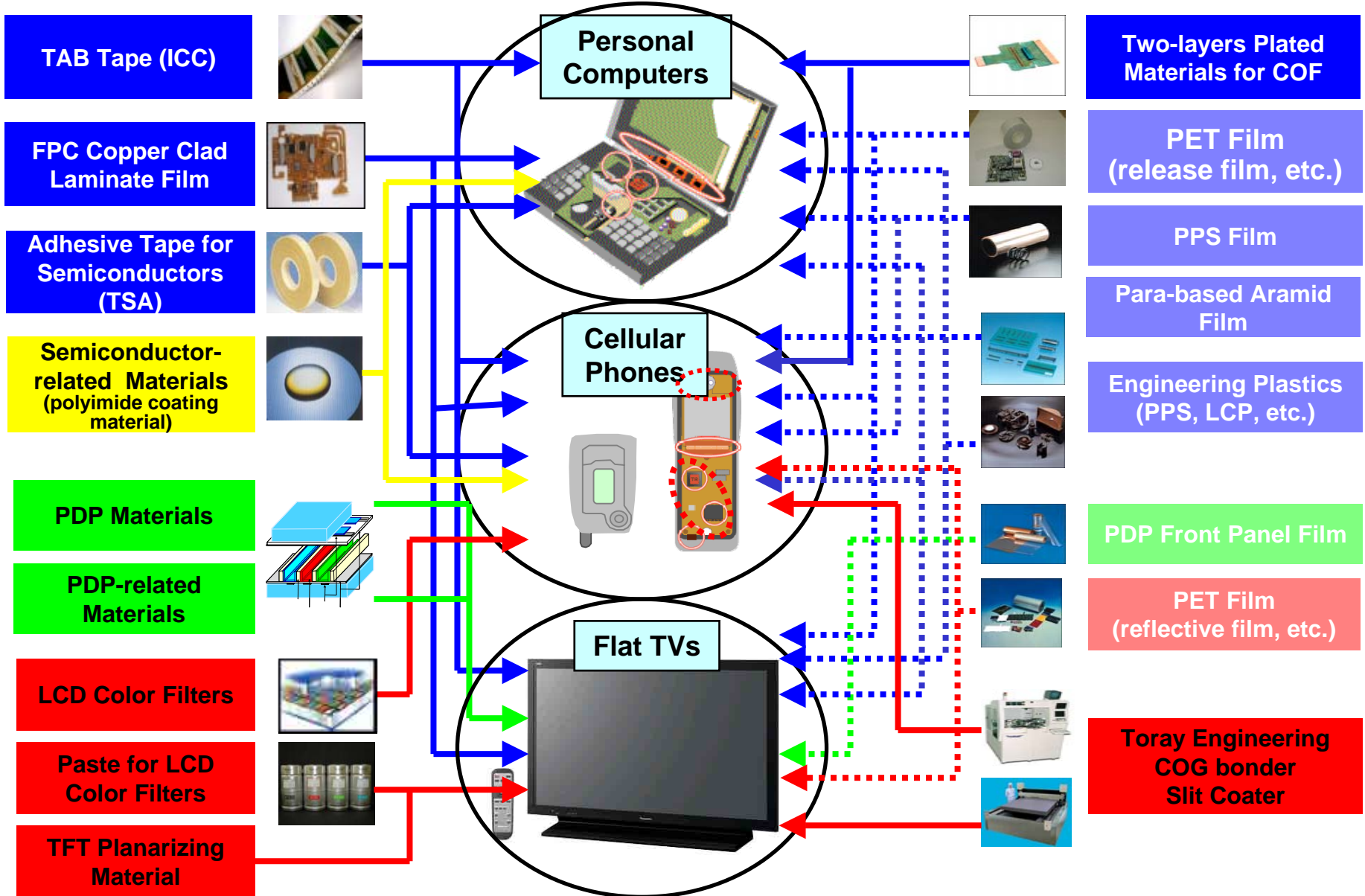


**IT-SBU (IT-Strategic Business Unit) : Central organization in charge of Toray Group IT-related Businesses**

# Technology Background of IT-related Products



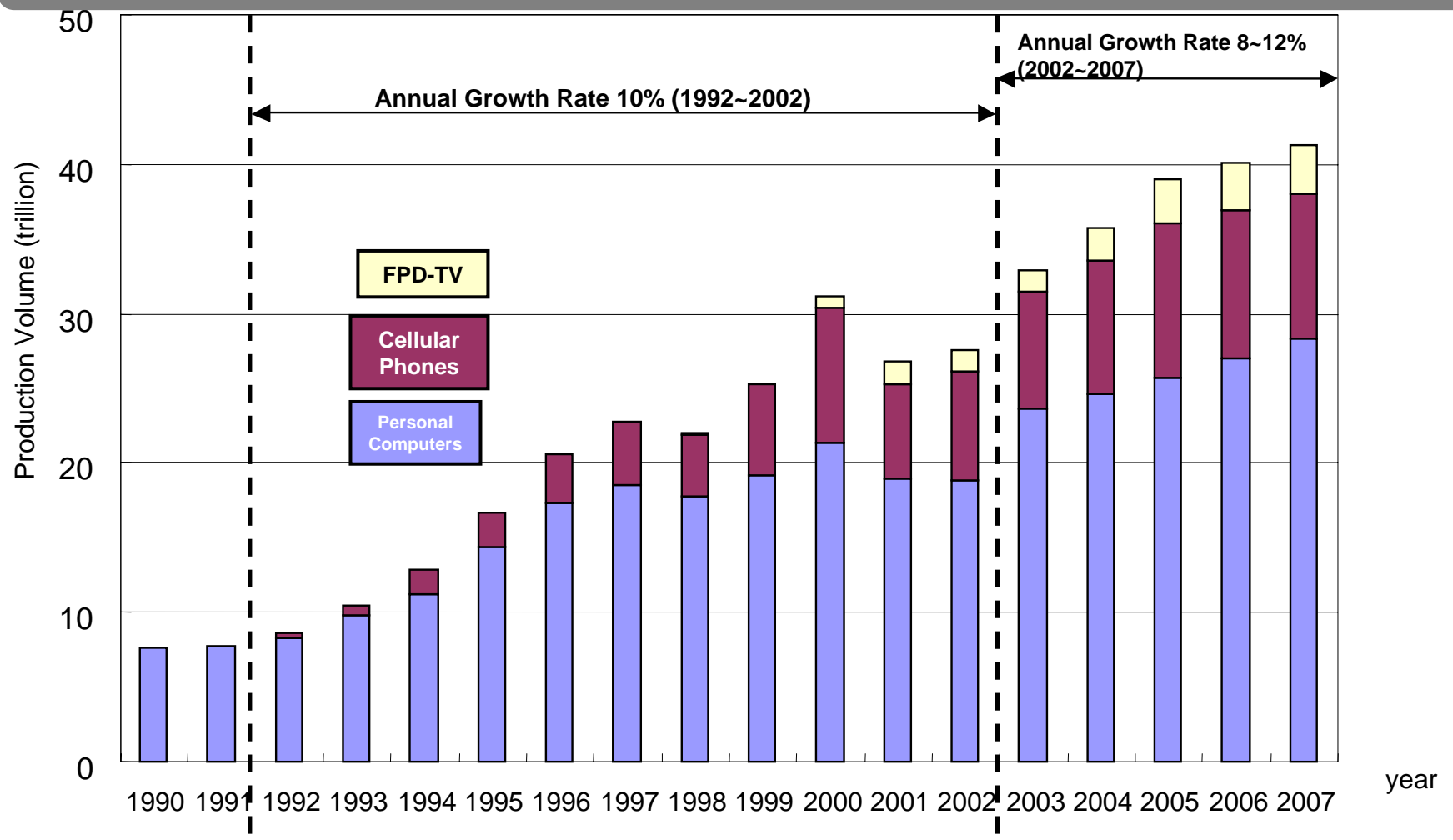
# Correlation Between Toray Products and End Products



# Global Market of Major Products Leading the Electronics Market



Personal computers, cellular phones, FPD-TV are the driving force of the electronics market, and double growth is still expected in the future



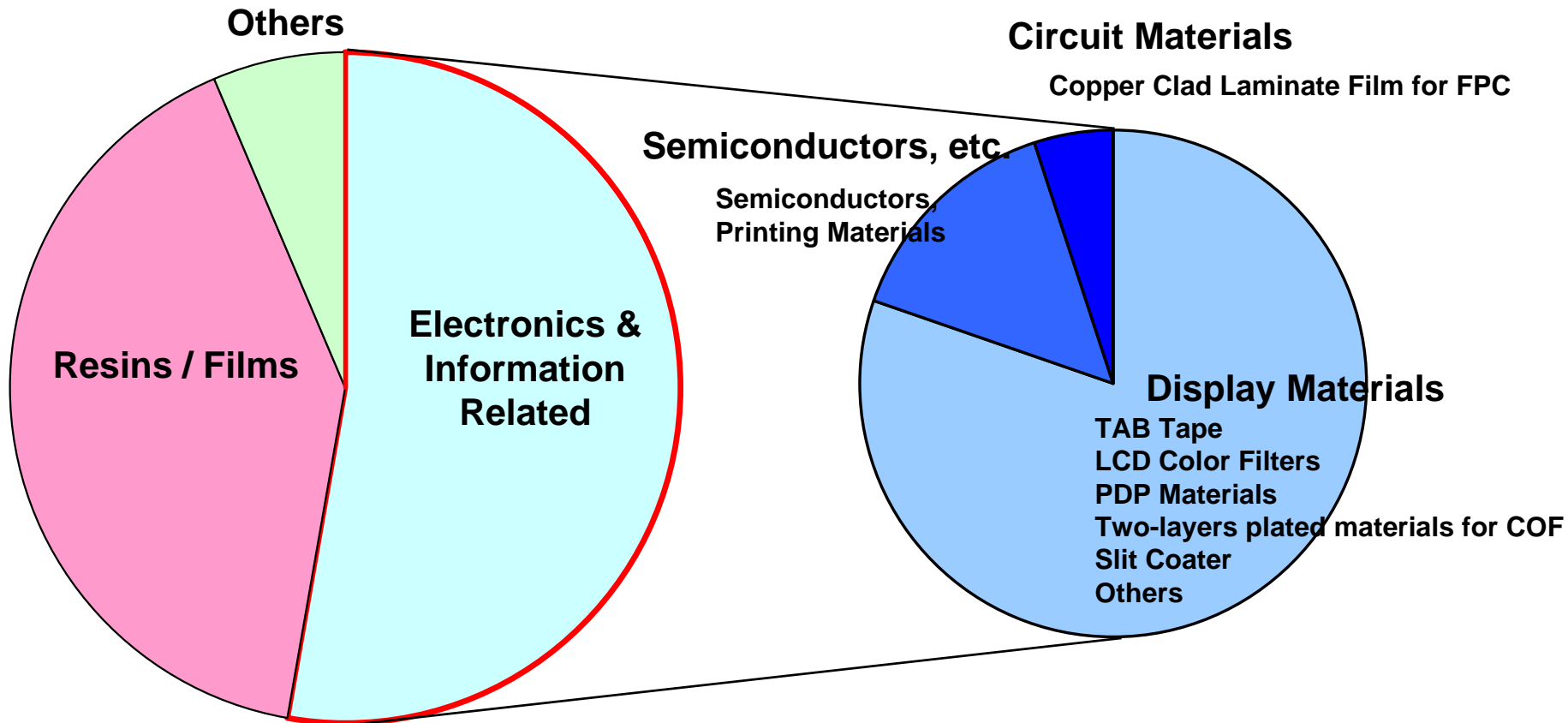
Toray estimation based on figures of research company

## II. Operation Review and Strategies for Electronics & Information Related Businesses

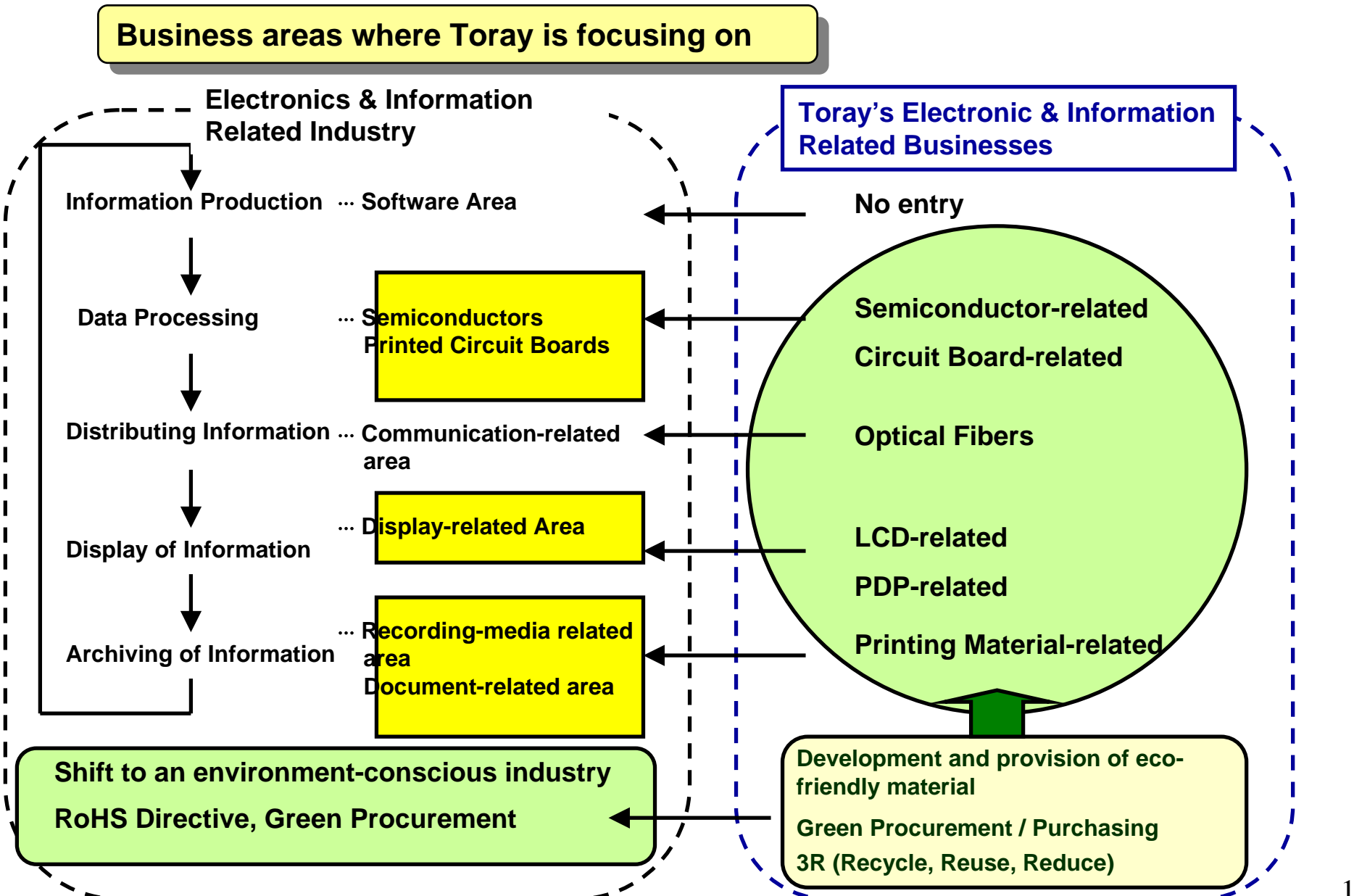
- 1. Business Scale of Electronics & Information Related Businesses**
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- 6. Advanced Materials Projects**

**Electronics & Information Related Businesses account for 50% of net sales of IT-related Products Segment**

215.0 billion yen (consolidated net sales forecast of FY Mar/05)



## 2. Toray's Business Position in the Electronics & Information Related Industry

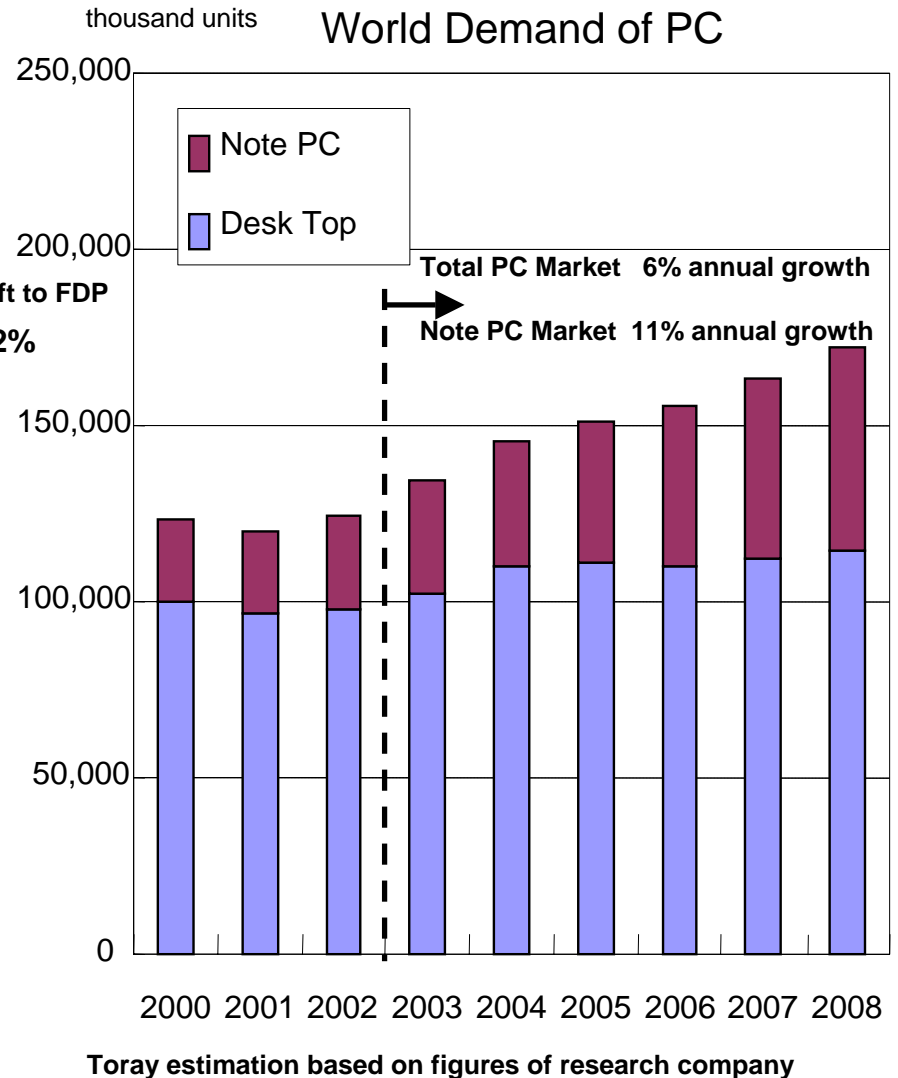
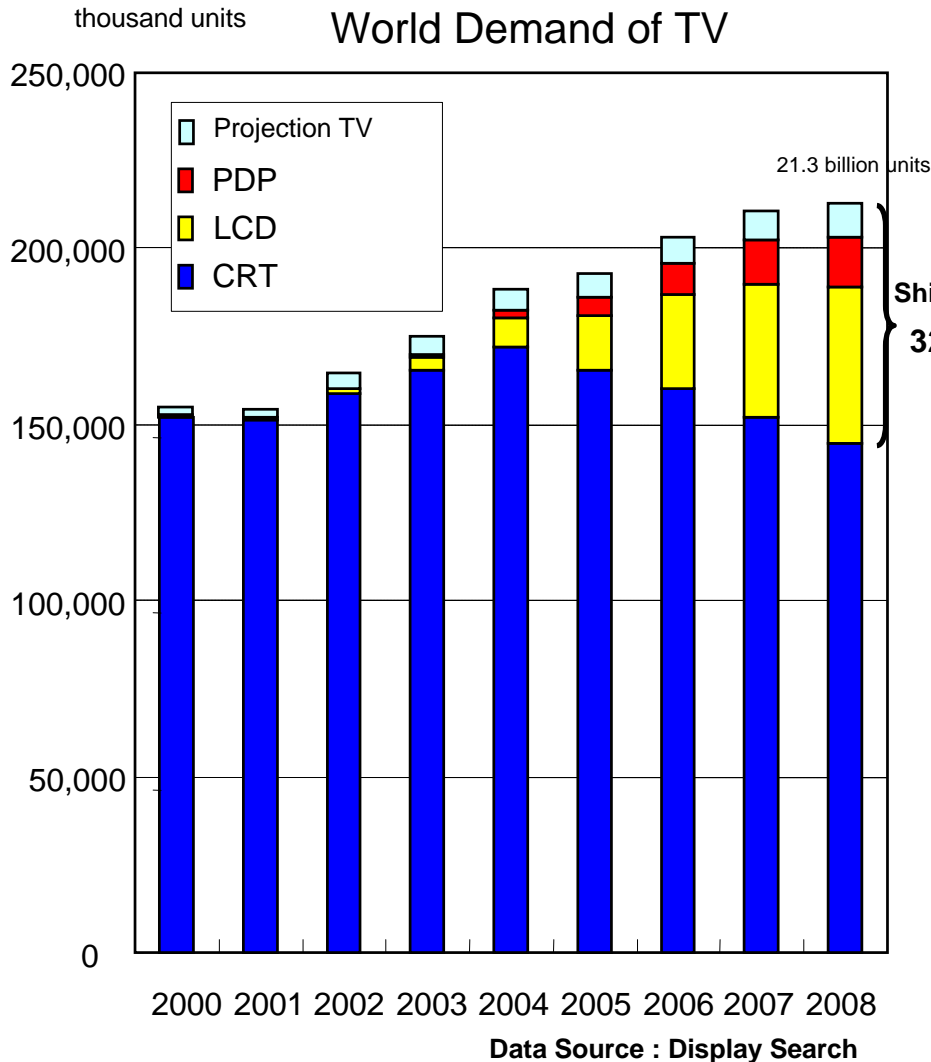




### 3. Strategies for Display Materials - **Market for Display Materials** Global Market for Television and Personal Computers



**Flat Panel Display (FPD) is growing dramatically and personal computers are also strong in the global market**



## Performance Comparison by Display Type

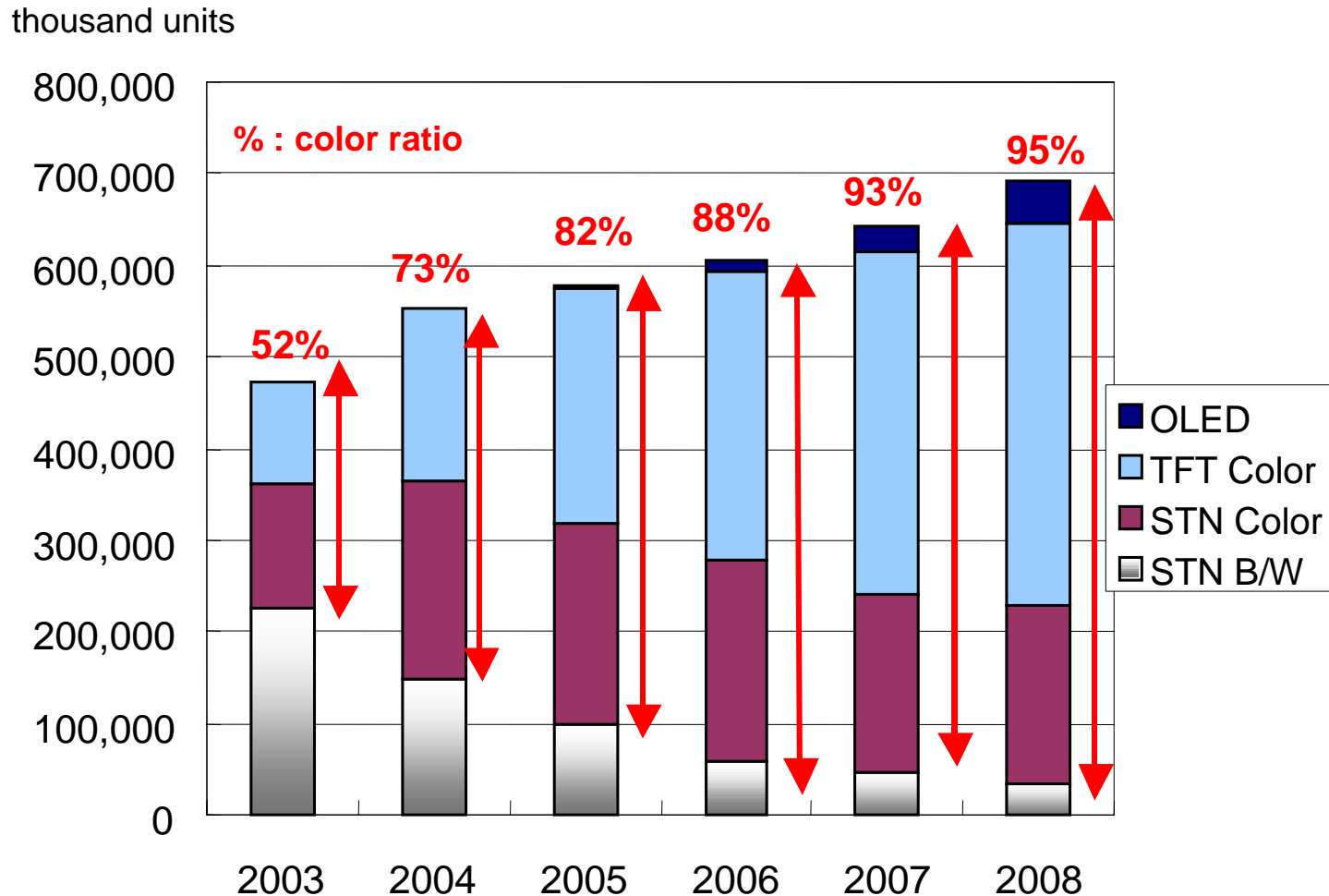
Expand mainly PDP and LCD in the large FPD area

	Cathode-ray Tube (CRT)	Plasma (PDP)	Liquid Crystal Display (LCD)	Rear Projection	Slim CRT
Flat Size (flatter than 100mm)	×	○	○	▲	▲
Large Size (over 37")	▲	◎	○	◎	▲
Movie Response Speed	○	○	△	○	○
Product Life (over 30,000 hrs.)	○	○	○	△ (lamp life)	○
Power Saving	○	○ → ◎	◎	◎	○
Bright Contrast	○	△ → ○	○	△	○
Dark Contrast	○	○	△	△	○
Viewing Angle	○	○	△	△	○
High-definition (Full -HD)	○	△ → ○	◎	○	○

◎ Excellent, ○ Good, △ Insufficient, ▲ Difficult to improve, × Impracticable

## Trends in World's Cellular Phone Market and Color Rate

Colorization increased rapidly with the expansion of cellular phone demand



Toray estimation based on figures of research company

# 3. Strategies for Display Materials – Business Strategies for LCD Materials

## Reengineering of Color Filter Businesses



### - Promoting Reengineering Project (S Project) -

		Before S Project (~2001)	Launch S Project (2002~)	Measures / Goals, and Results
Business Environment		<p><b>Large-size Application:</b> (note PC, monitor, TV)</p> <p>Birth of LCD TV, rise of Korea/Taiwan, m-grade-size glass, <b>promotion of self-manufacture of color filters, excess supply, severe price competition</b></p>	<p><b>Medium/Small-size Applications:</b> Sharp growth of cellular phones, (cellular phone, digital camera, car navigation system) <b>rapid colorization, high-function</b></p>	<p>Struggle to attain income increase in the large-size market due to <b>cost burden and intense price fluctuation for commodities</b></p> <p>Shift to medium/small size applications where <b>specifications in</b> with highly functional technology is possible</p> <p style="text-align: center;">↓</p> <p><b>Income Increase</b></p>
Reengineering of Color Filter Businesses	Organization	Production/Sales/Technology Independent Organization	Production/Sales/Technology Integrated Organization	<b>Accelerated decision-making</b> _→ quick response to environmental change
	Application/Technology Strategy	<b>Mainly large-size application (note PC, monitor)</b> Struggling, not able to exercise the superiority of polyimide materials	<b>Shift to Medium/Small Size Applications</b> Shift to color cell-phones and others where superior performance of polyimide materials can be applied	Toray's trans-reflective LCD for color cell-phone applications contributed to the <b>establishment of de facto standard</b>
	Engagement With Customers	Mainly Taiwan and domestic PC manufacturer	<b>Strengthen engagement with major medium/small size manufacturers</b> (Samsung G, TMD, Seiko G. others)	Specifications in for customers from the design stage, production of <b>custom products</b>
	Price	<b>Drastic changes</b> affected by PC market condition	<b>Strive for price maintenance</b> Early achievement of high value-added products to meet the needs of multi-functionality	<b>Succeed in restraining price changes</b> by meeting customers' specifications and producing custom products
	Manufacturing Line	<b>Two manufacturing bases:</b> Seta (LM-2) / Shiga (LM-3-4)	<b>Integrate</b> LM-2 into Shiga LM-3, <b>Specialize in resin BM</b>	Promote production efficiency → <b>improve cost competitiveness</b> <b>Reduce environmental impact by using chrome-free BM</b>

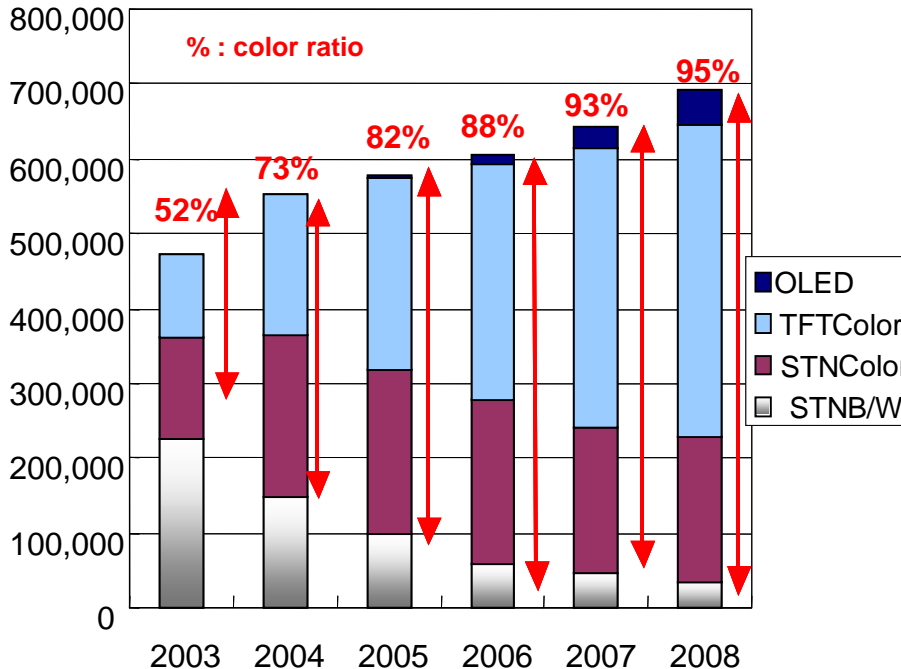
### 3. Strategies for Display Materials – Business Strategies for LCD Materials



#### Cellular Phone Demand and Price Trends in Medium and Small Size LCDs

- Colorization increased rapidly with the expansion of cellular phone demand
- LCD module price is predicted to drop continuously. Medium/small size applications will shift to high value-added products to meet the multi-function demand for cellular phone use, which will restrain the price drop

Thousand units Demand and Color Ratio of Cell-phones

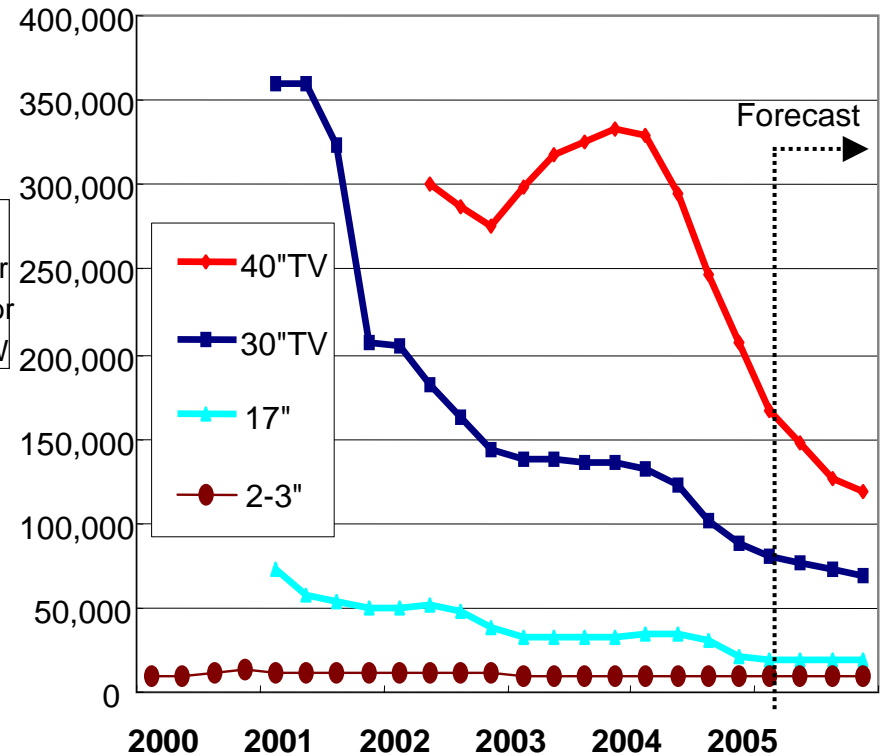


Toray estimation based on figures of research company

Definition of LCD Size at Toray:

Classification	Size	Main Applications
Medium/Small	Below 10"	Cellular phones, car navigation systems, PDA, digital cameras
Large	Over 11"	Note PC's, monitors, LCD TV's

Yen Price Trends in LCD Modules

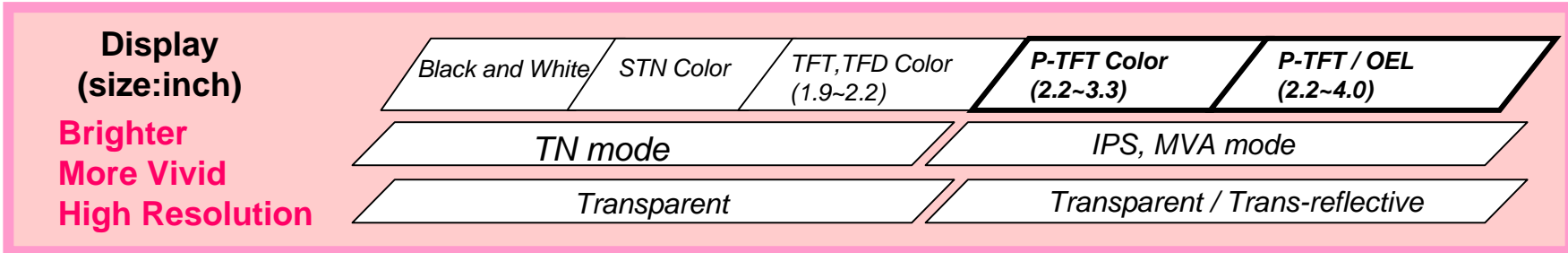
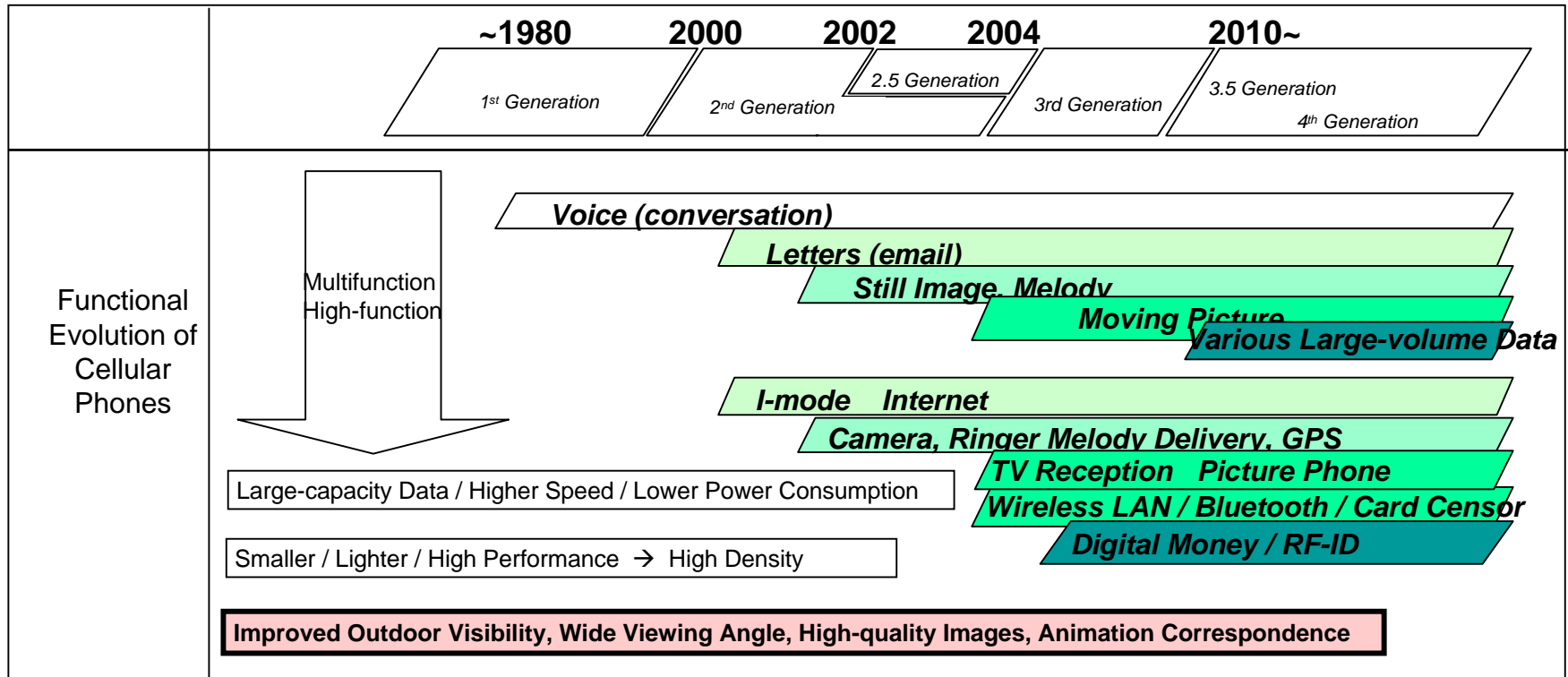


Toray estimation based on figures of research company

### 3. Strategies for Display Materials – Business Strategies for LCD Materials

## Product Roadmap for Cellular Phones

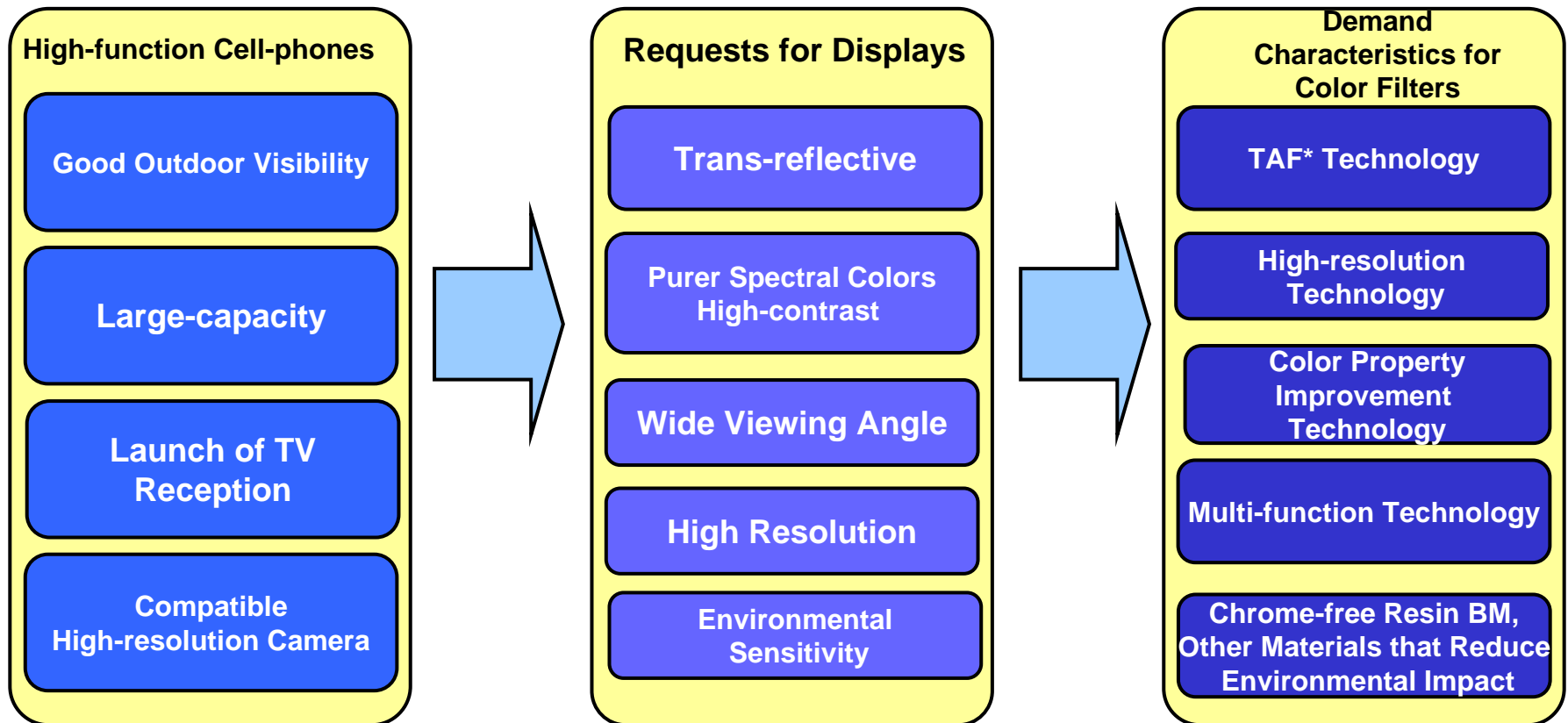
With advances in transmission methods and the high value-added functionality of cellular phones, devices with high-performance have been developed with the aim of realization a ubiquitous network



### 3. Strategies for Display Materials – **Business Strategies for LCD Materials**

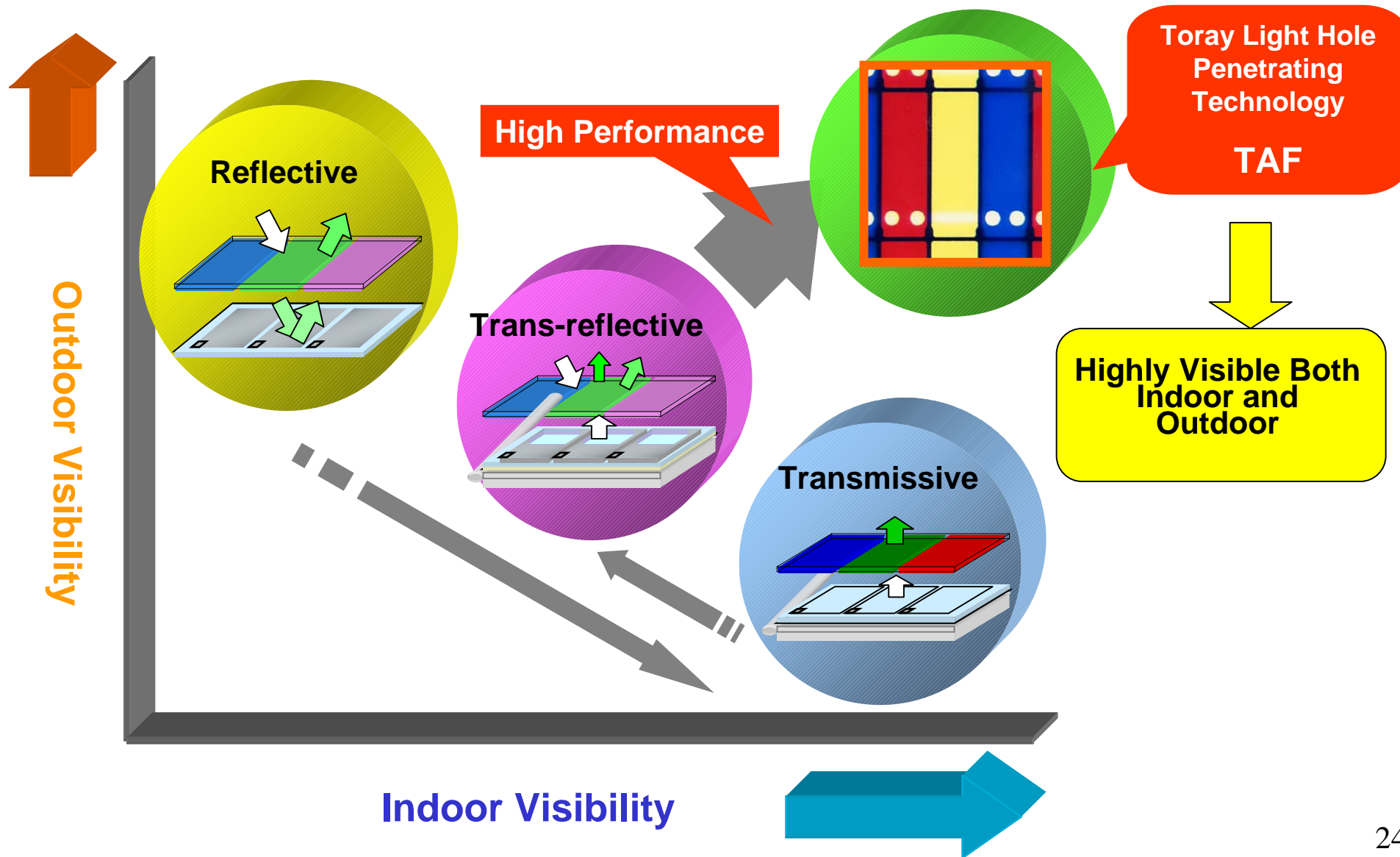
Fundamental Technologies of Color Filters Corresponding to the Needs of High Function of Cellular Phones

Toray's trans-reflective color filter (TAF technology) based on Toray's composite technologies, realizes high-quality display images, which are indispensable to the evolution of cellular phones (large-capacity, picture phone, TV reception)



\*TAF Technology : Toray Advanced Color Filter (Trans-reflective Technology)

Toray Trans-reflective Color Filters (TFA) Applied in Cellular Phones

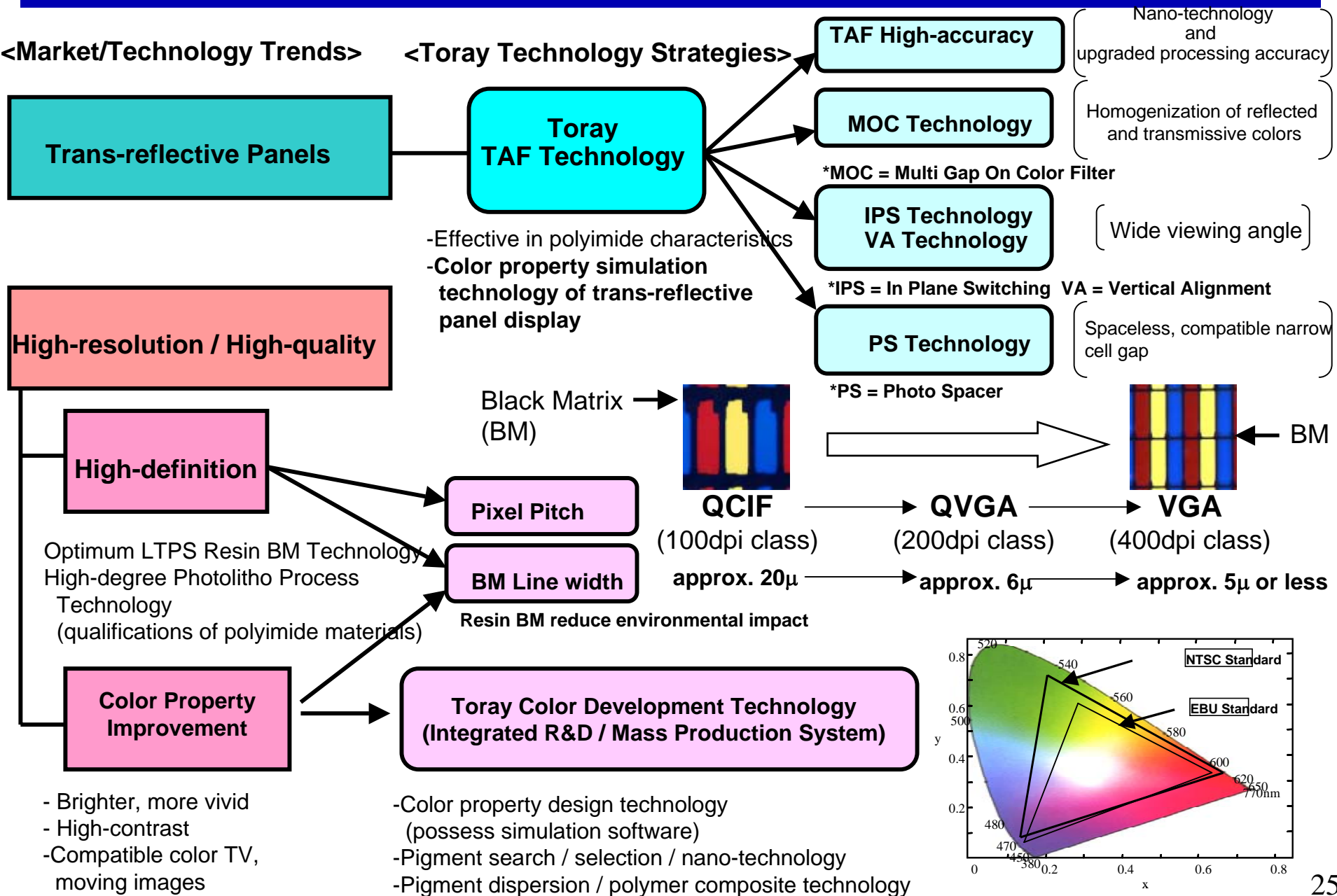




# 3. Strategies for Display Materials – Business Strategies for LCD Materials



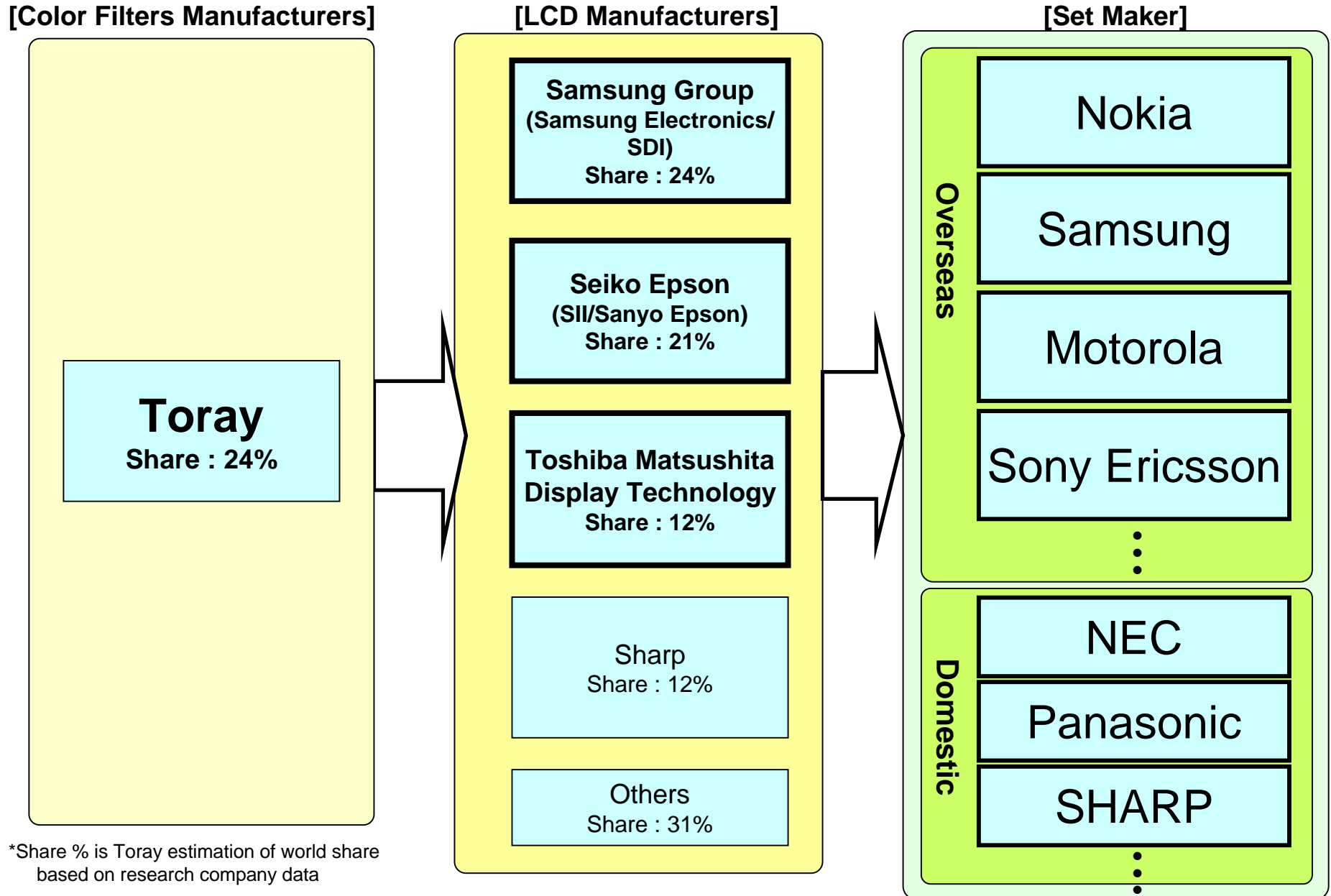
## Fundamental Technologies for Medium/Small Size LCD Color Filters



### 3. Strategies for Display Materials – **Business Strategies for LCD Materials**



## Supply Chain of LCD for Color Cellular Phones (include STN)



\*Share % is Toray estimation of world share based on research company data

# 3. Strategies for Display Materials – Business Strategies for LCD Materials

## Fifth Capital Investment of Color Filters (LM-5 Project)



### Toray Color Filter Production Line

#### [Existing Line]

LM-3 : Size 400mm x 500mm Capacity : 80,000 sheets/month  
 LM-4 : Size 620mm x 750mm Capacity : 60,000 sheets/month



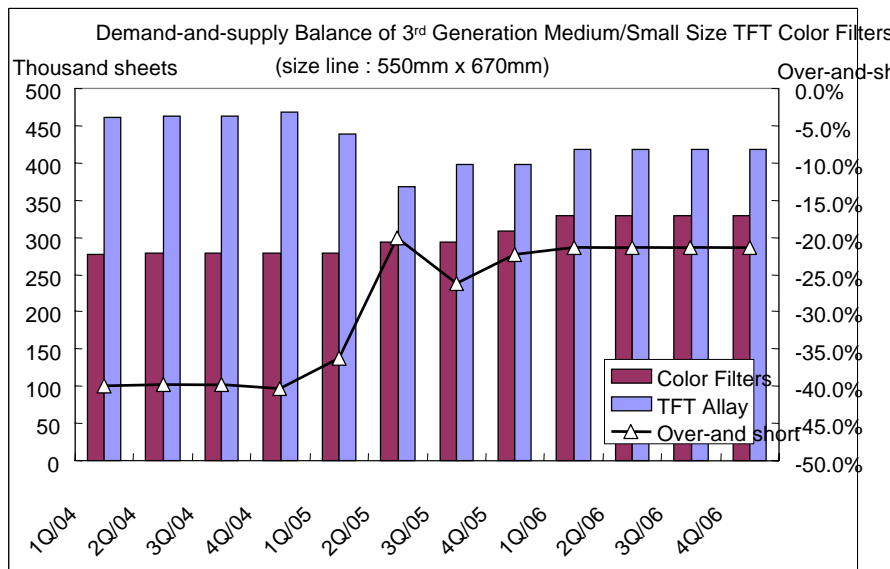
#### [New Line]

- Medium/ Small Size Exclusive Plant (for high-end high value-added products) -

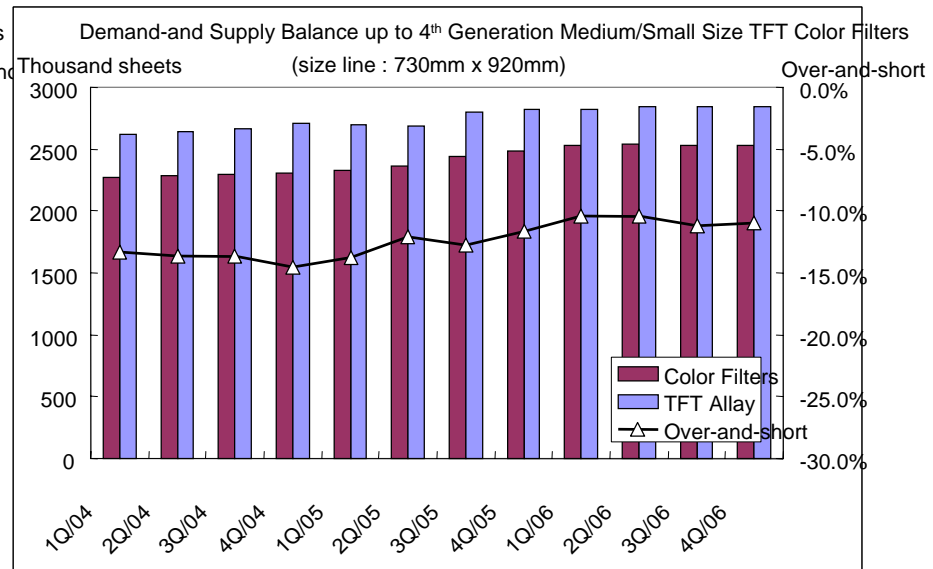
LM-5 : Divisional capacity increase in 3 stages of 3<sup>rd</sup> to 4<sup>th</sup> generation size line

1<sup>st</sup> Stage : Size 550mm x 670mm ~ 620mm x 750mm Capacity : 15,000 sheets/month (start April,05)  
 2<sup>nd</sup> Stage: Size 550mm x 670mm ~ 620mm x 750mm Capacity : 15,000 sheets/month (date TBA)  
 3<sup>rd</sup> Stage : TBA

- [Target] 1. To maintain or expand top share in the color cellular phone market (600 million units around 2007, color ratio 90%)
- 2. Main production line for medium/small size filters is expected to expand to the 3<sup>rd</sup> ~4<sup>th</sup> generation from 1<sup>st</sup> ~2<sup>nd</sup>.
- 3. Capacity increase is based on a prediction that substantial shortage will appear mainly in 3<sup>rd</sup> generation color filters.



Latest capacity increase of each LCD and color filter manufacturers included

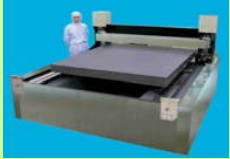



Toray estimation based on research company data

### 3. Strategies for Display Materials – Business Strategies for LCD Materials



## Market Requirements for Large Size LCD Displays and Toray Strategies

Application	Market Trends	Technology Trends In Panels	Issues	Toray Strategies Offer Total Solution for Self-manufacturer of Color Filters
<b>LCD TV (Large Size)</b>  ~ 50 inch or larger	Tough Competition with CRT/Rear Projection/PDP (quality and price competition)	Strengthen Cost Competitiveness by Production Efficiency and Cost Reduction, others	Increase Capacity Size (= investment increase)  Shorten Tact-time	[Slit Coater] (Spinless Coater) Development/Sales of 5 <sup>th</sup> ~8 <sup>th</sup> Generation  
	Respond to Full-HD, Upgrade of Picture Quality	High-definition High-contrast Wide Viewing Angle	Thinner BM Line Color Purity of Color Paste	[Paste Material] Resin BM, Commercialize of High-sensitive/High Color Purity Paste  

Promotion of Self-manufacturer of LCDs

High-function Paste Materials

## Two Business Strategies related to PDP

### Joint Venture with Matsushita Electric

Strengthen Cost Competitiveness of PDP Panels and Expand Market Share

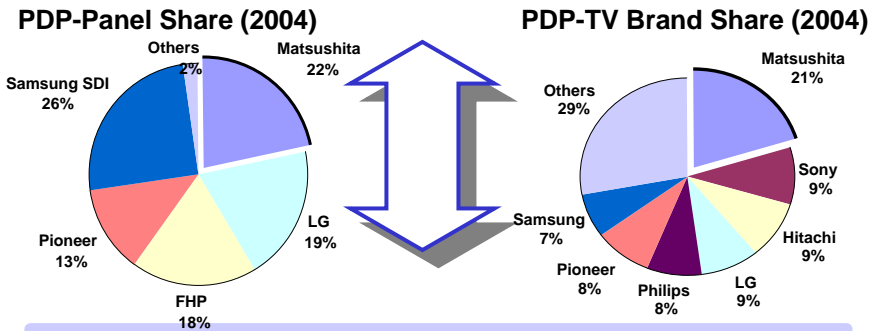
Joint Venture

Matsushita PDP Co., Ltd.

**Investment** 30 billion yen

**Capital Ratio** Toray : 25 Matsushita : 75

**Established** September 2000



### Paste Materials for PDP Rear Panels + Process Technology

- Photosensitive Barrier Rib Paste
- Photosensitive Silver Paste
- Derivatives Paste
- Phosphor Paste

### Expand Strategically in PDP-related Materials

Promotion of De Facto Standard in PDP Panels

#### Customers

- PDP Panel Manufacturer
- Driver IC Manufacturer
- PDP-related Components Manufacturer
- Others

#### PDP-related Products

- TAB Tape for Driver IC
- Front Panel Materials
- Front Panel Filter Materials
- Rear Panel Radiating Material (under development)

### Characteristic Comparison of PDP/ LCD (response speed)

Larger LCD images are more likely to be indistinct affected by difference in response speed.

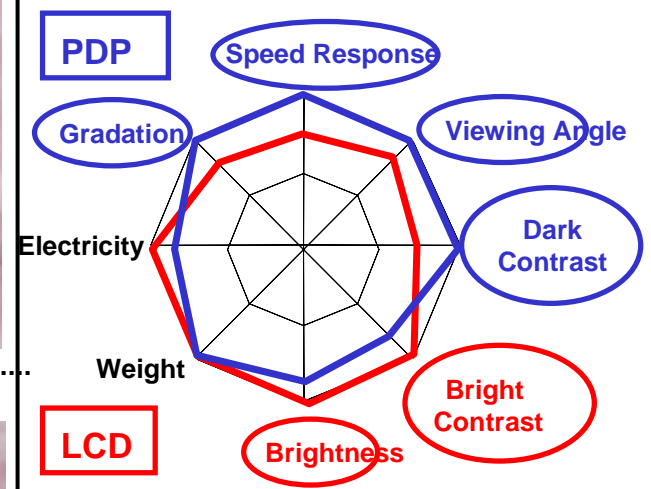
**PDP**



**LCD**



Comparison with 30" class (2005)



- Upgrades to energy consumption, brightness, and bright contrast of PDPs are underway, by improving the panel structure and drive system.



### 3. Strategies for Display Materials – Business Strategies for PDP-related Materials

#### Characteristic Comparison of PDP/ LCD (reliance on viewing angle)



PDP is self-luminous, so the viewing angle is unrestricted

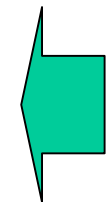
**PDP**



45 degrees

Straight to Front

45 degrees

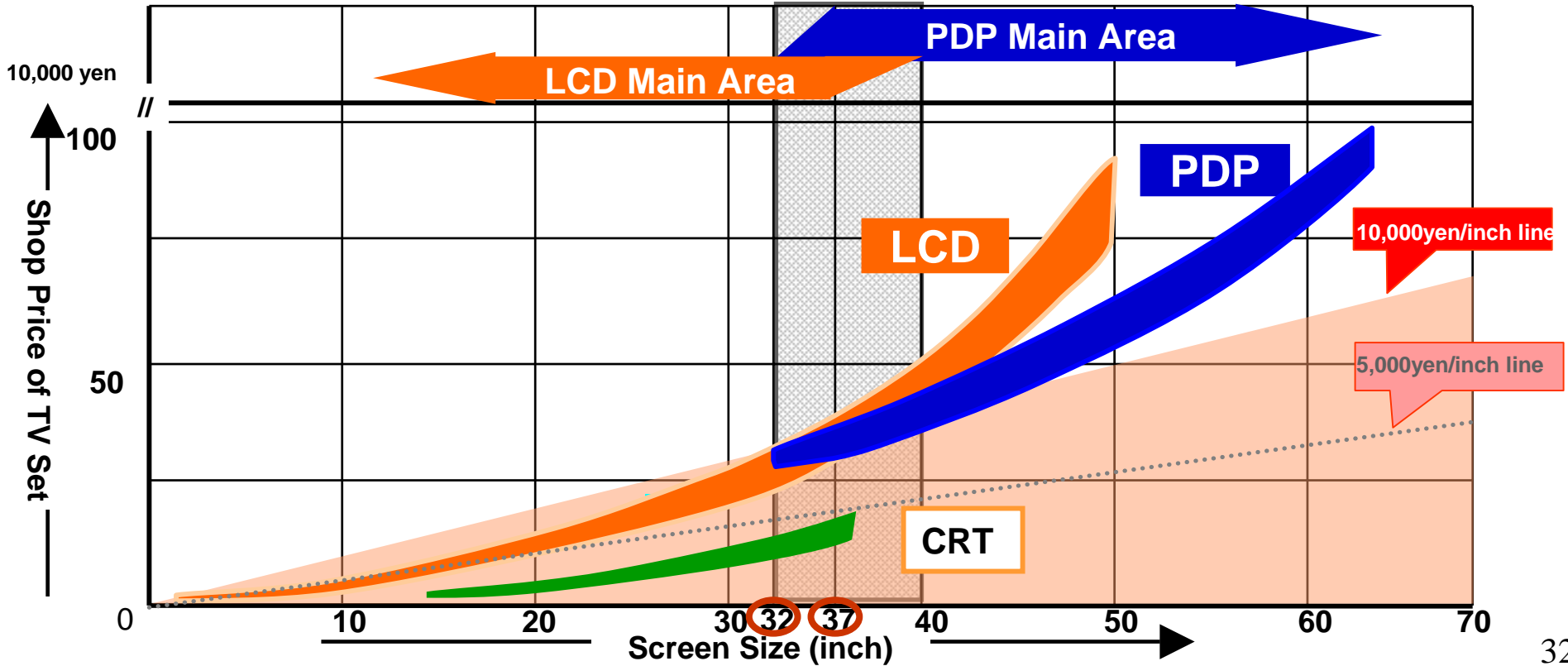


**LCD**

## Competition in Flat-screen TV Systems

Some view the boundary between LCD and PDP as the 40 inch line, but Toray considers 37 inch line as the borderline

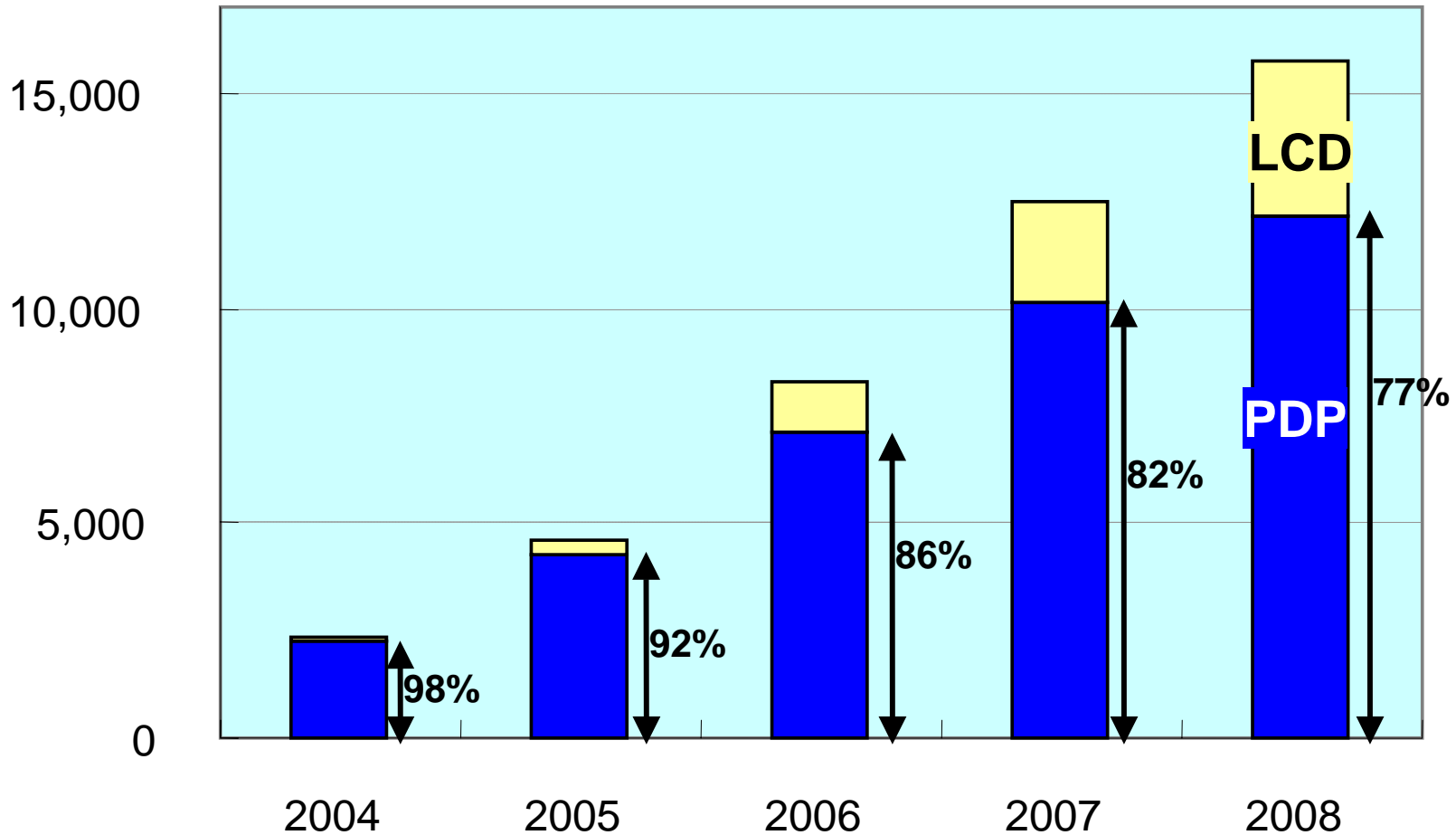
	32 inch and smaller is mainly LCD	37 inch and larger is mainly PDP
Performance	Superior in brightness / bright contrast	Superior in speed response / viewing angle, brightness is equivalent
Energy Consumption	Small displays are more low-power and brighter	Luminous efficiency improved to level of LCD
Cost	Lower costs in multiple panels than PDP	Lower cost of circuit rationalization than LCD





**PDP / LCD Comparison in the 40 inch line and Larger TV Market (units)**

Thousand units



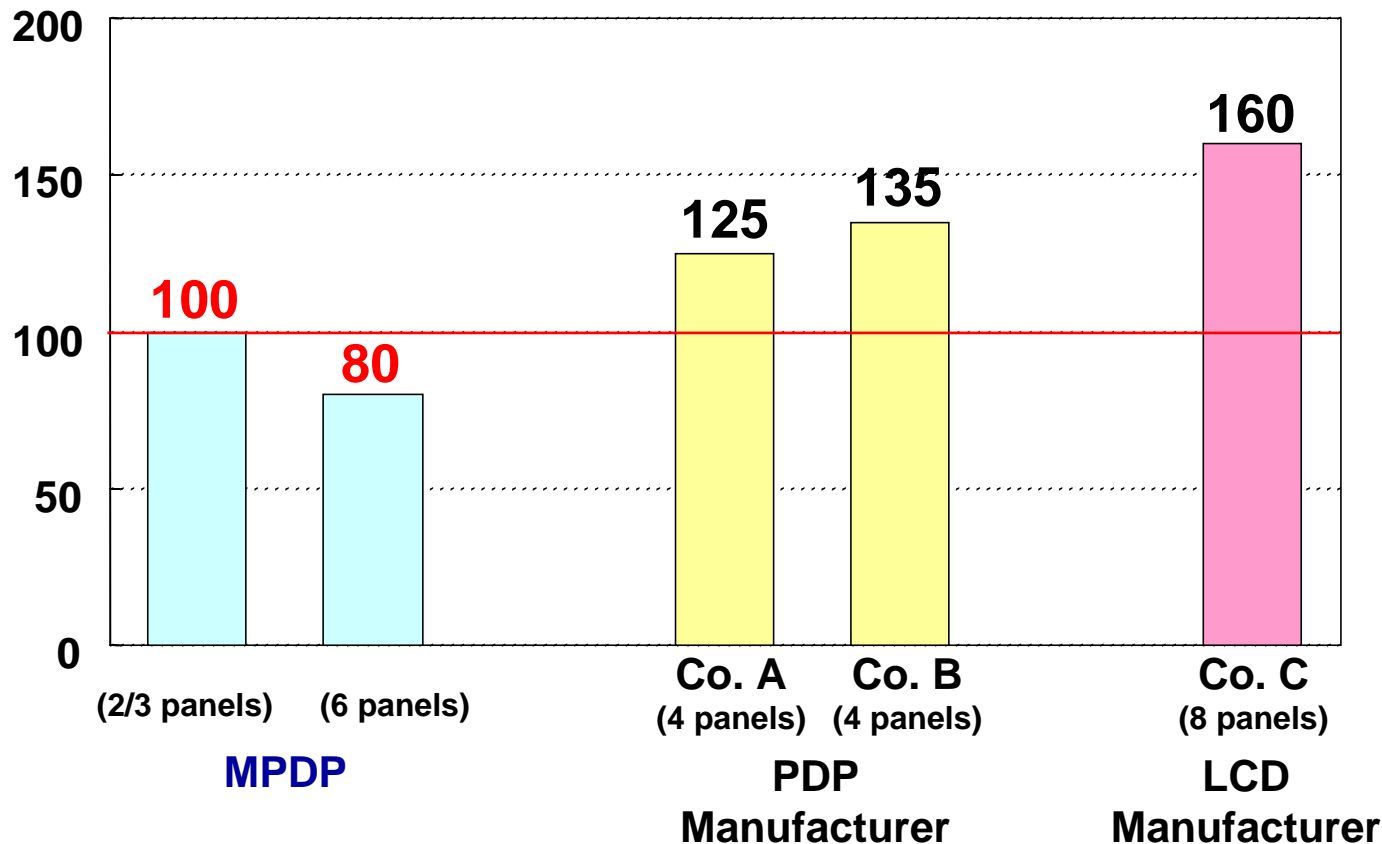
Data by Display Research Co.

## Financial Efficiency Comparison of PDP and LCD

- PDP is more efficient in investment per unit
- Large size multiple panels (over 6) is a key point

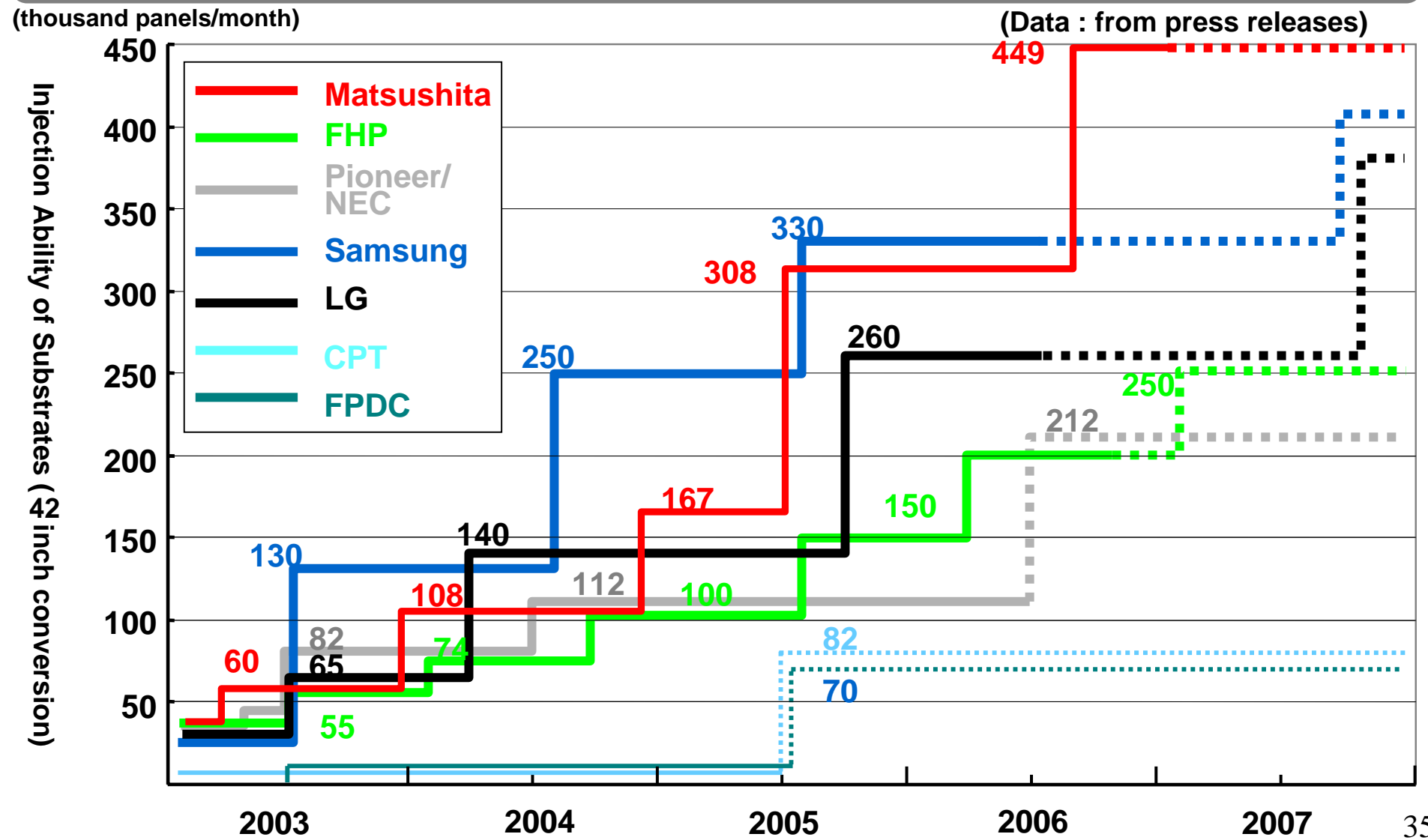
(index)

**Investment Comparison per Unit (comparison in 42 inch line)**



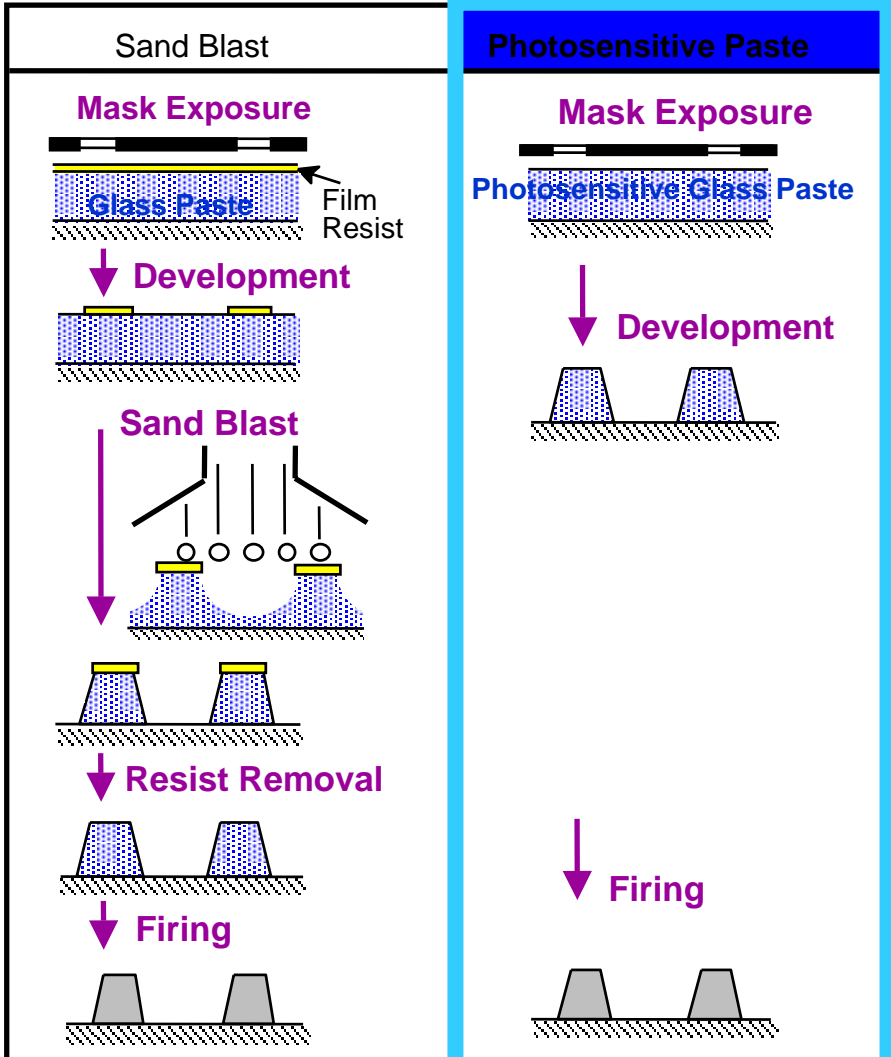
### Injection Ability Forecast of PDP Panel Manufacturer

MPDP Co. will aim for "World No.1" and build up the largest production capacity at the earliest



**Toray photosensitive paste method in barrier ribs formation technologies actualizes high-resolution and high productivity**

**Process Comparison**



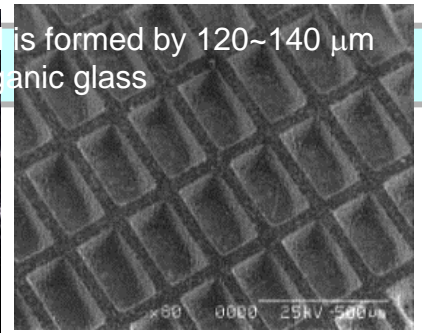
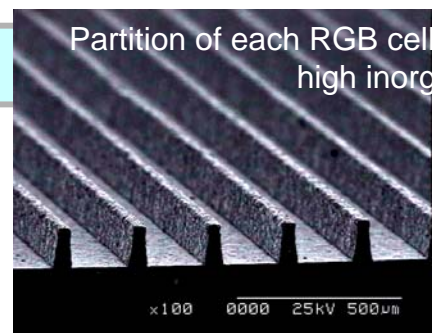
**1. High Productivity**

- Less number of processes (left )
- High-speed tact-time possible
- Easily adaptable to multiple panel production

**2. Conformity to various shapes**

Stripe-shape

Grid Pattern



**3. Fine Processing Possible**

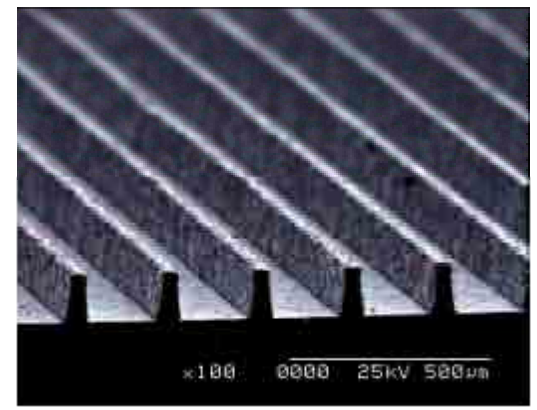
High-resolution (including full HD)

## High-resolution (including full HD)

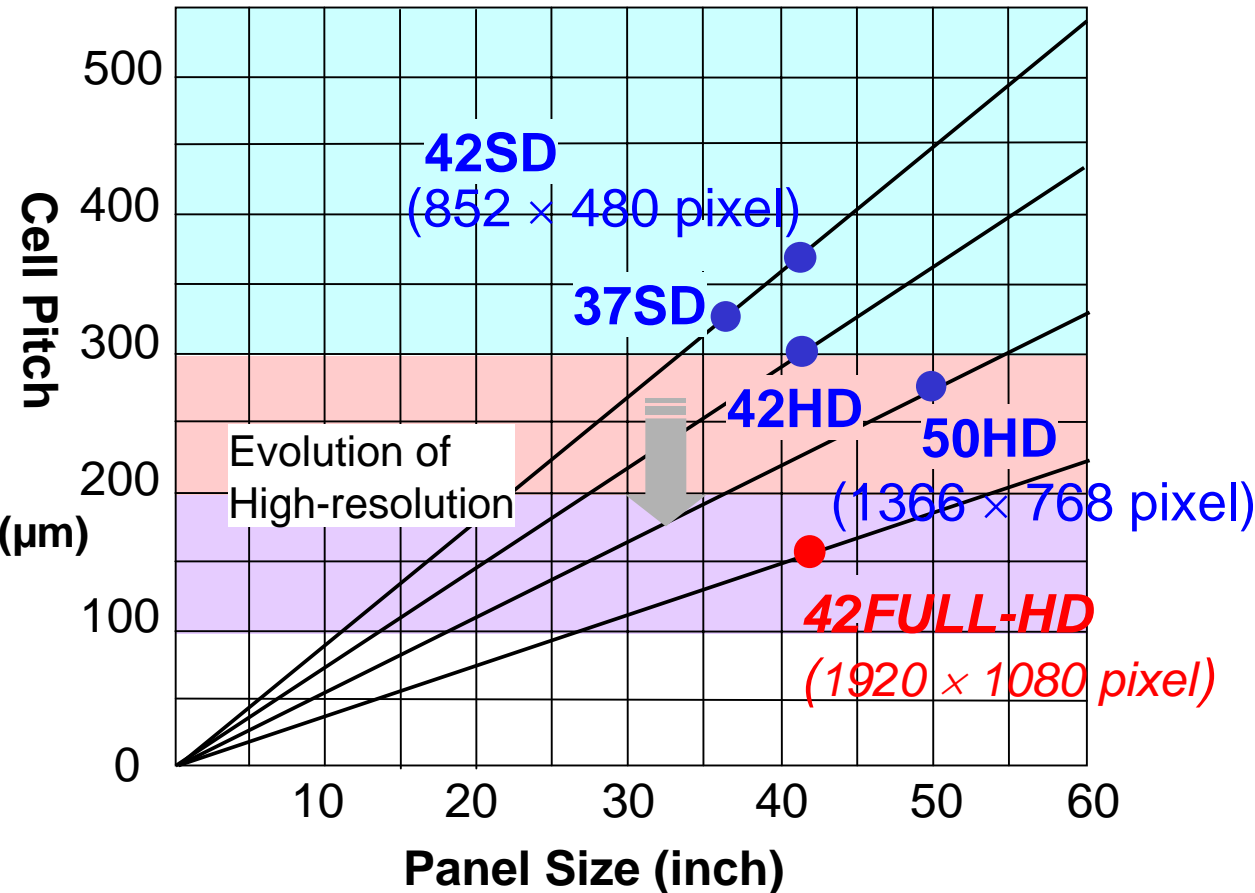
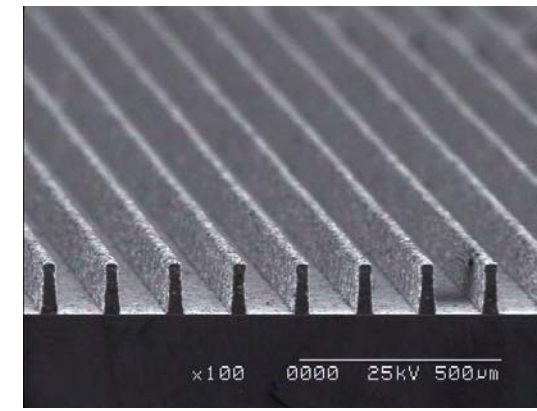
Advantages of photosensitive paste method in response to high-resolution

- Fine processing possible (pitch < 200 $\mu$ m)
- Cell opening possible by cut narrowing the line width of barrier ribs

Pitch 270  $\mu$ m(equivalent of 50HD)



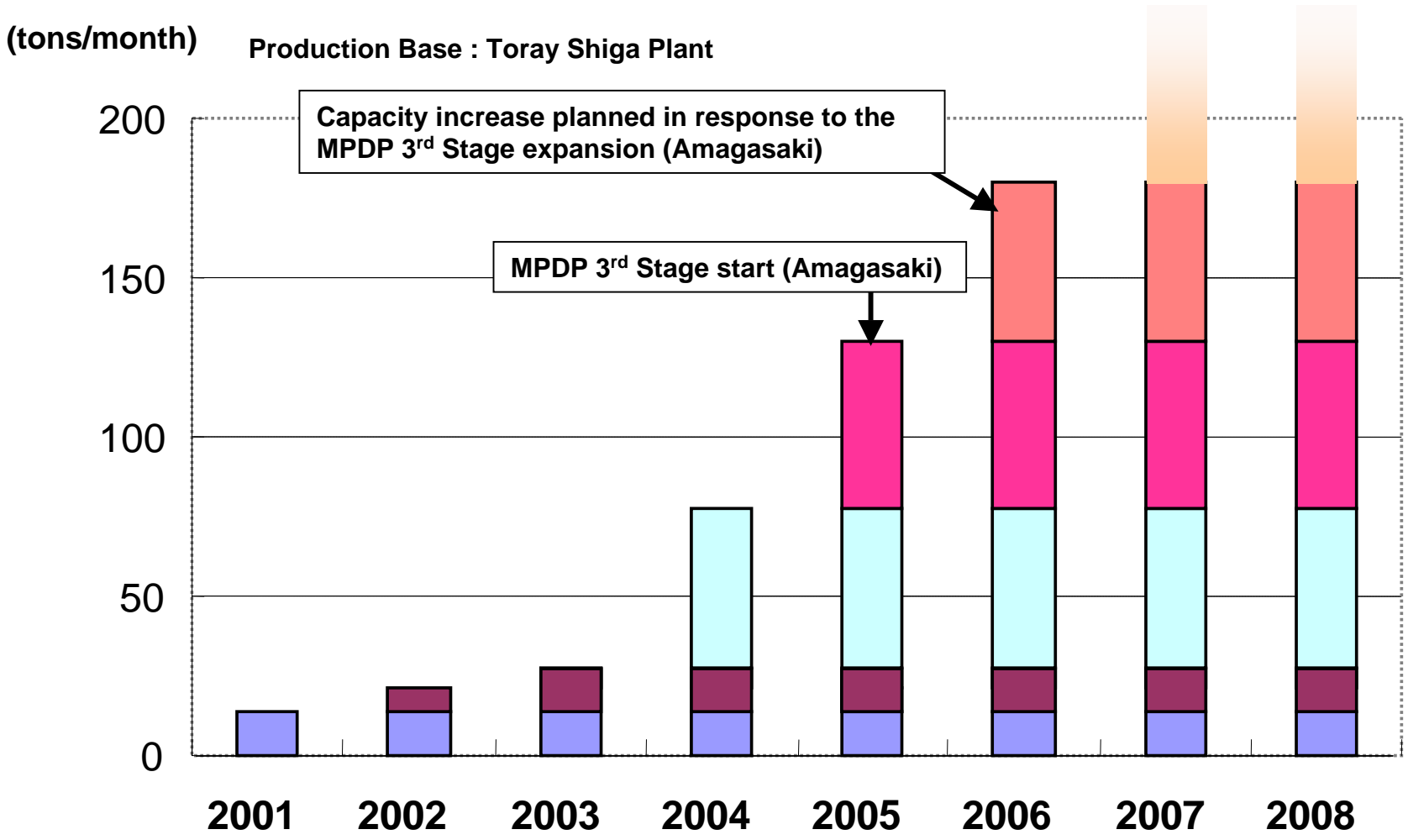
Pitch 150  $\mu$ m(42 Full-HD)



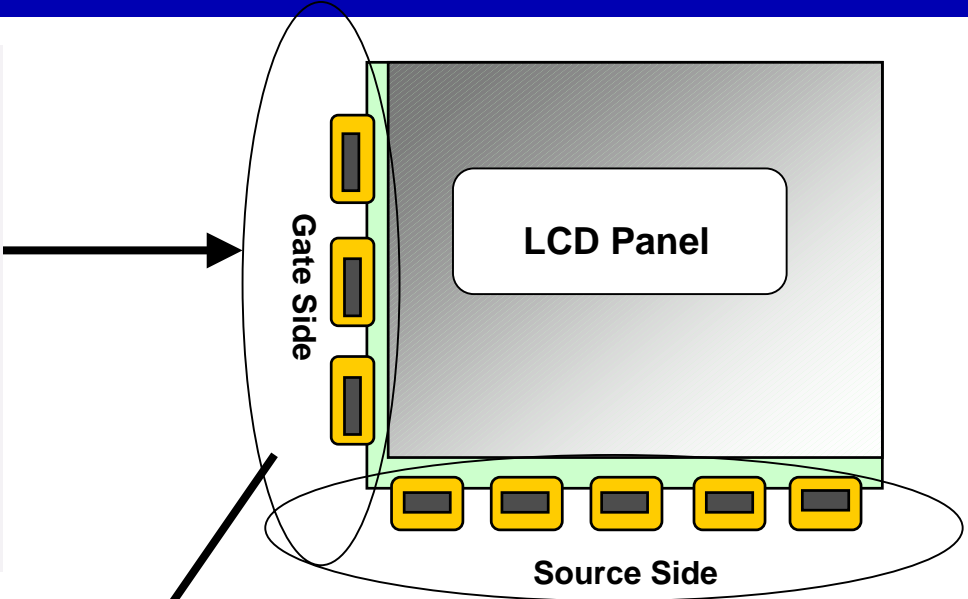


## Production Capacity Increase Project for Toray PDP Paste Material

Implement sequential capacity increase for paste material to suit the MPDP project

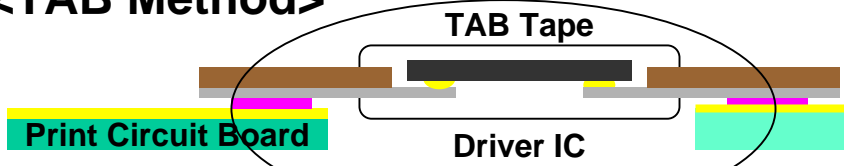


# Structure of Driver IC Bonding for LCD Displays

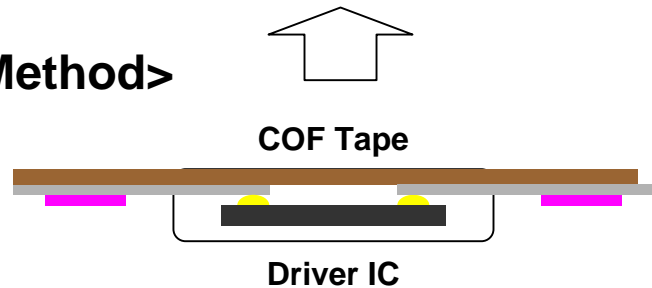


## Driver IC Bonding

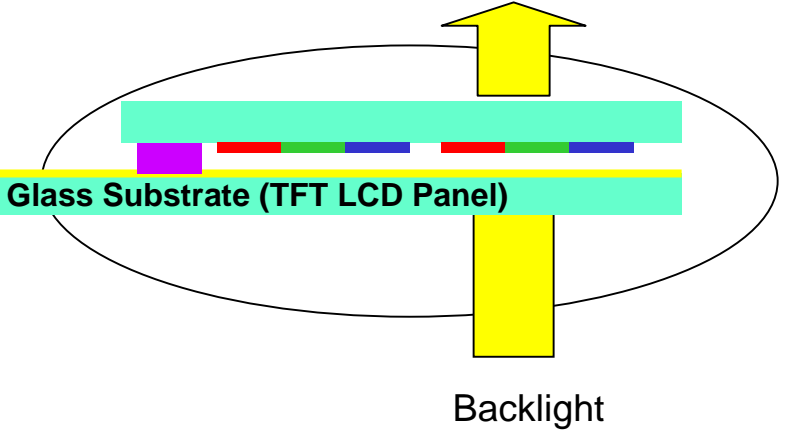
### <TAB Method>



### <COF Method>



## LCD Panel



## Bonding Technology Roadmap for LCD Display

High-resolution and cost reduction → Increase number of pins, finer pitch

### <Technology Trends for Fine Pitch>



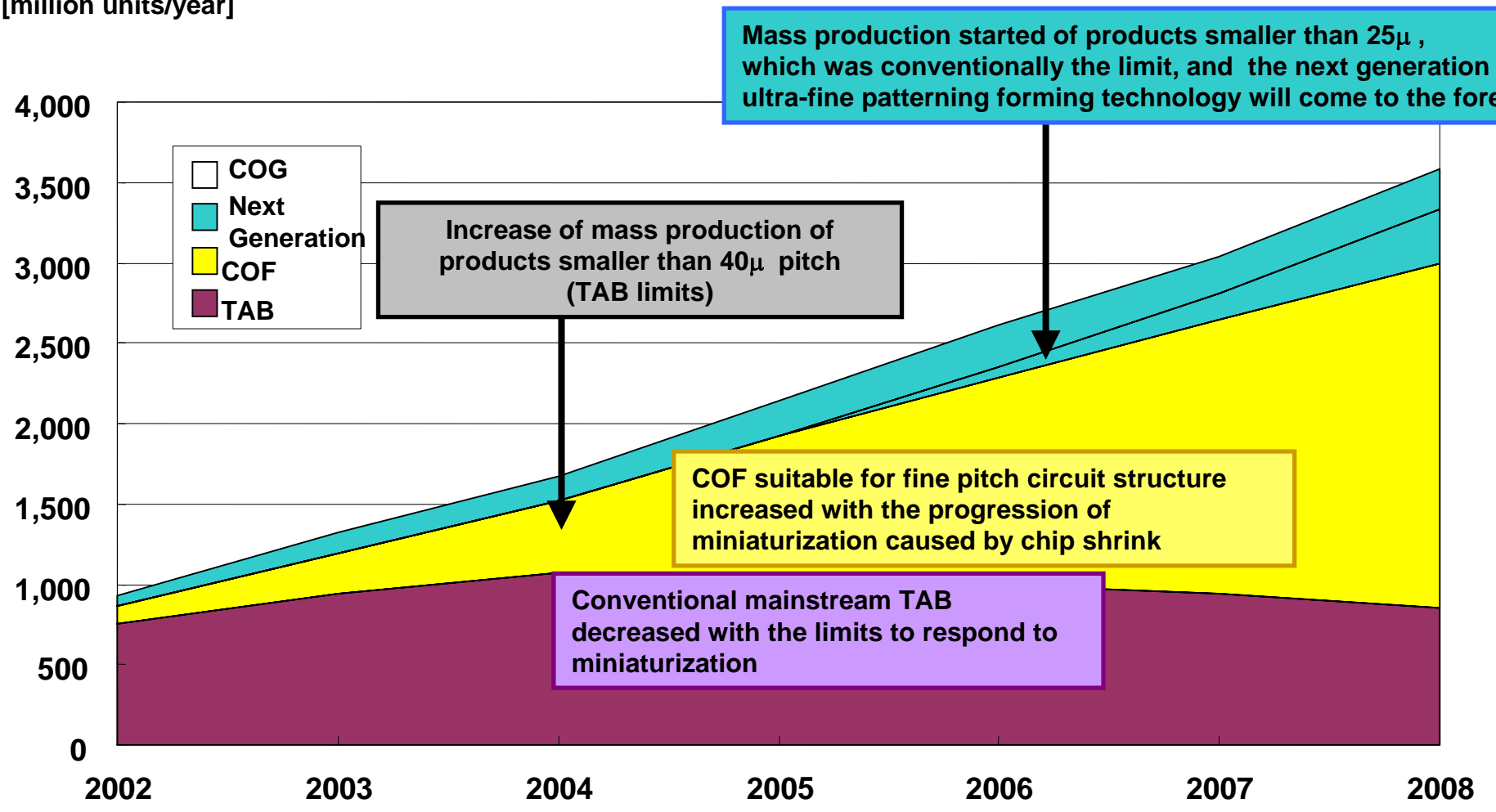
	2000	2003	2005	2010	
High-resolution Increase of IC Pins	<p>1                      1.5                      2~3</p> <p>Increase ratio of pins when that of 2003 is assumed as 1</p>				
Finer Pitch	<p>60 ~ 40<math>\mu</math>m                      30<math>\mu</math>                      25<math>\mu</math>                      10<math>\mu</math></p>				
Mounting Method	Pitch				
	50 $\mu$	40 $\mu$	30 $\mu$	20 $\mu$	10 $\mu$
TAB Bonding	→ 35 $\mu$				
COF Bonding	→ 25 $\mu$				
Plating					
COG Bonding	→ 20 $\mu$				
Next Generation COF	→ 10 $\mu$				
	Toray Group Technology				
	TAB Tape (ICC)				
	Two-layers plate (Metaloyal*)				
	Ultra-fine Pattern Process Technology (under development)				



### Market Scale of Driver ICs for Large-size LCDs, by Method

Transfer to new bonding method in need to respond to finer pitch

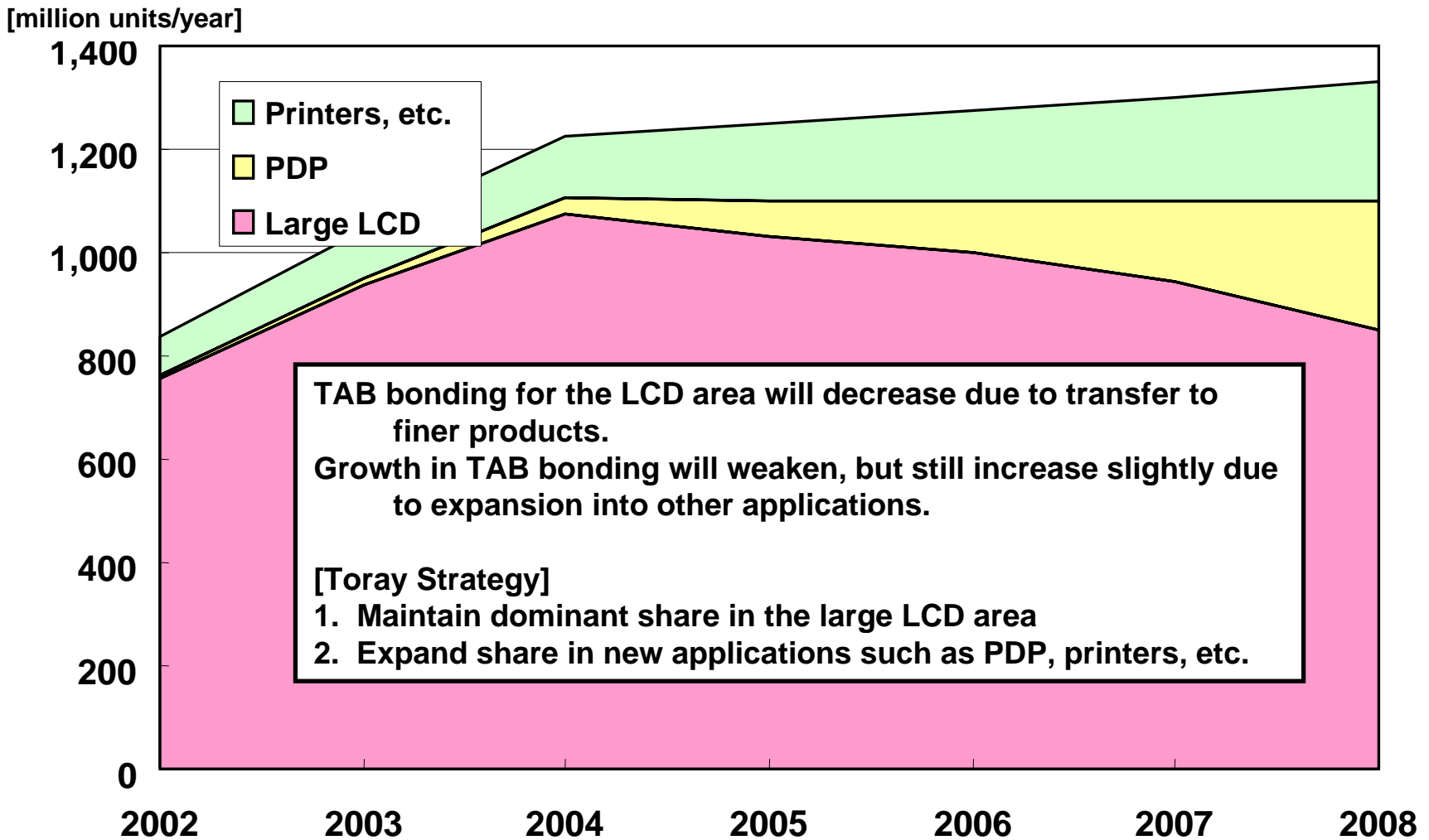
[million units/year]



Toray estimation based on figures of research company

## Increase of TAB Bonding Method

TAB bonding applications shifted from LCD driver to other uses (PDP area, printers, etc.)



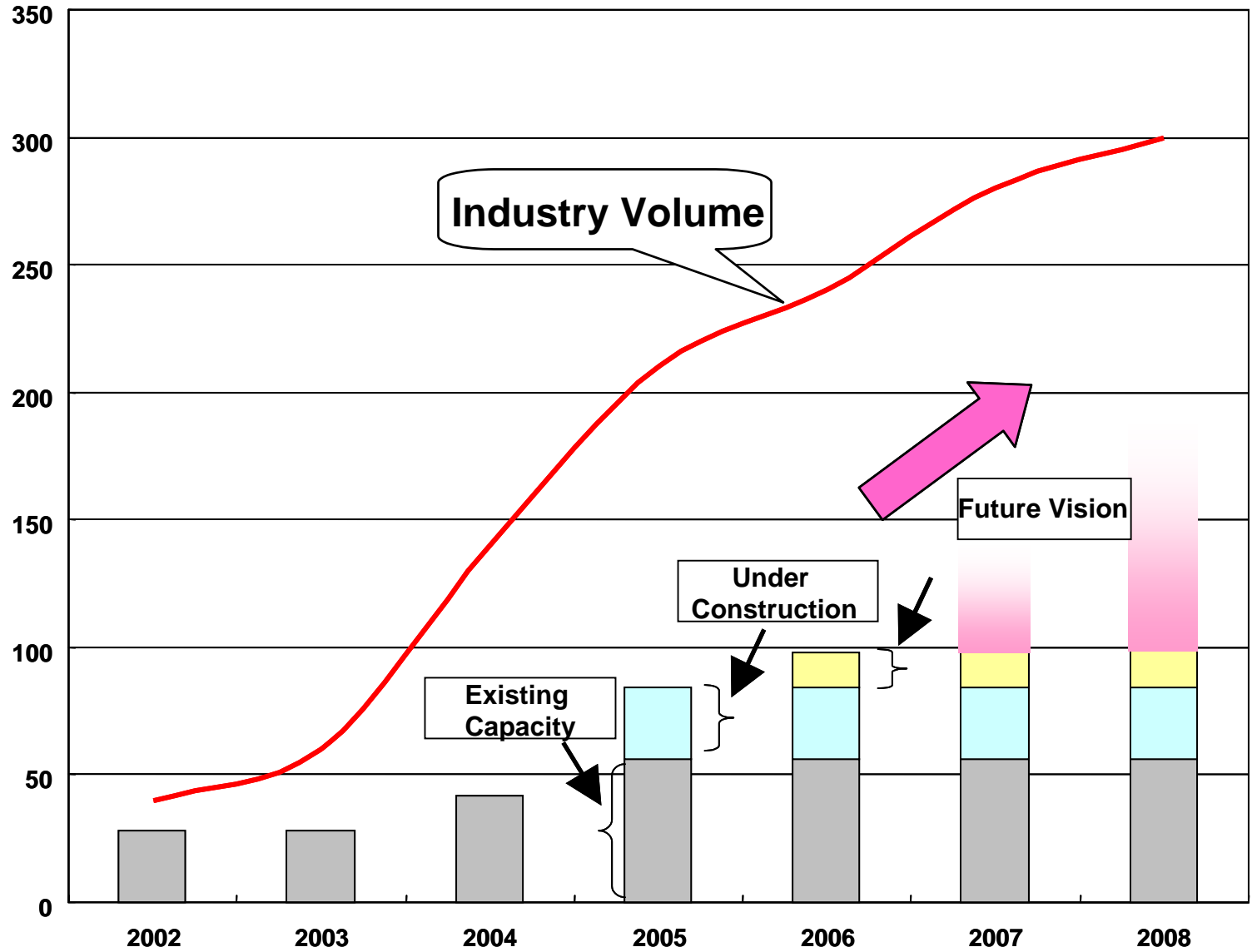
TAB bonding for the LCD area will decrease due to transfer to finer products.  
 Growth in TAB bonding will weaken, but still increase slightly due to expansion into other applications.

[Toray Strategy]  
 1. Maintain dominant share in the large LCD area  
 2. Expand share in new applications such as PDP, printers, etc.



## Expansion of Two-layers Plating Material for COF Bonding (Metaloyal\*)

[thousand m<sup>2</sup>/month] <Production Capacity Increase Project of Toray Advanced Film Co.>



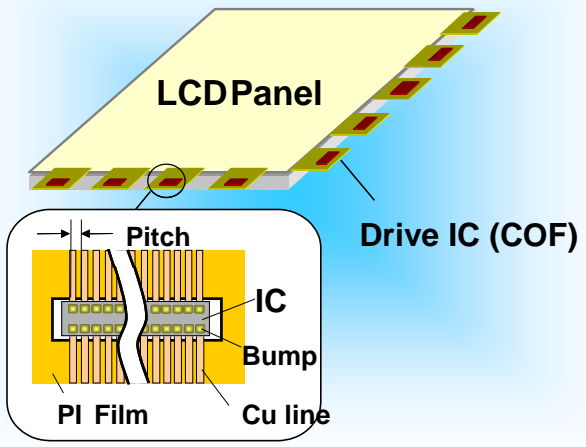
### 3. Strategies for Display Materials – Business Strategies for Driver IC Bonding and Circuit Materials

#### Next Generation Technology of COF

(development of ultra-fine patterned flexible film circuit manufacturing technology)

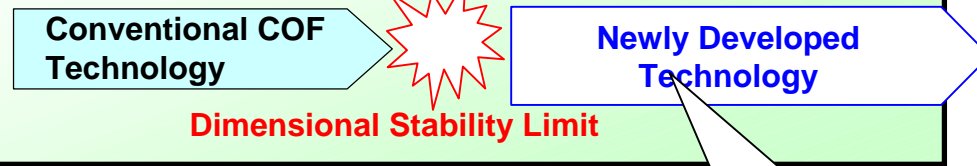
- Start : 2006  
 - Market Size (2008) : 10 billion yen

#### LCD / IC Connection



#### Trend in Connection Pitch of LCD Drive ICs

Year	2003	2004	2005	2006	2010
Pitch (μm)	35	30	25	20	10
Dimensional Tolerance (%)	± 0.04		± 0.02		± 0.01

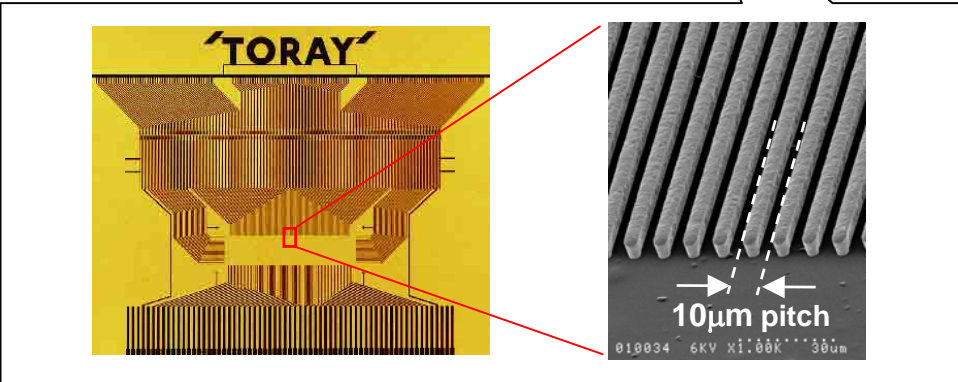


#### Excellent Properties

- ◆ Under pitch of 10μ
- ◆ Dimensional stability of ±0.001%

#### Technical Points

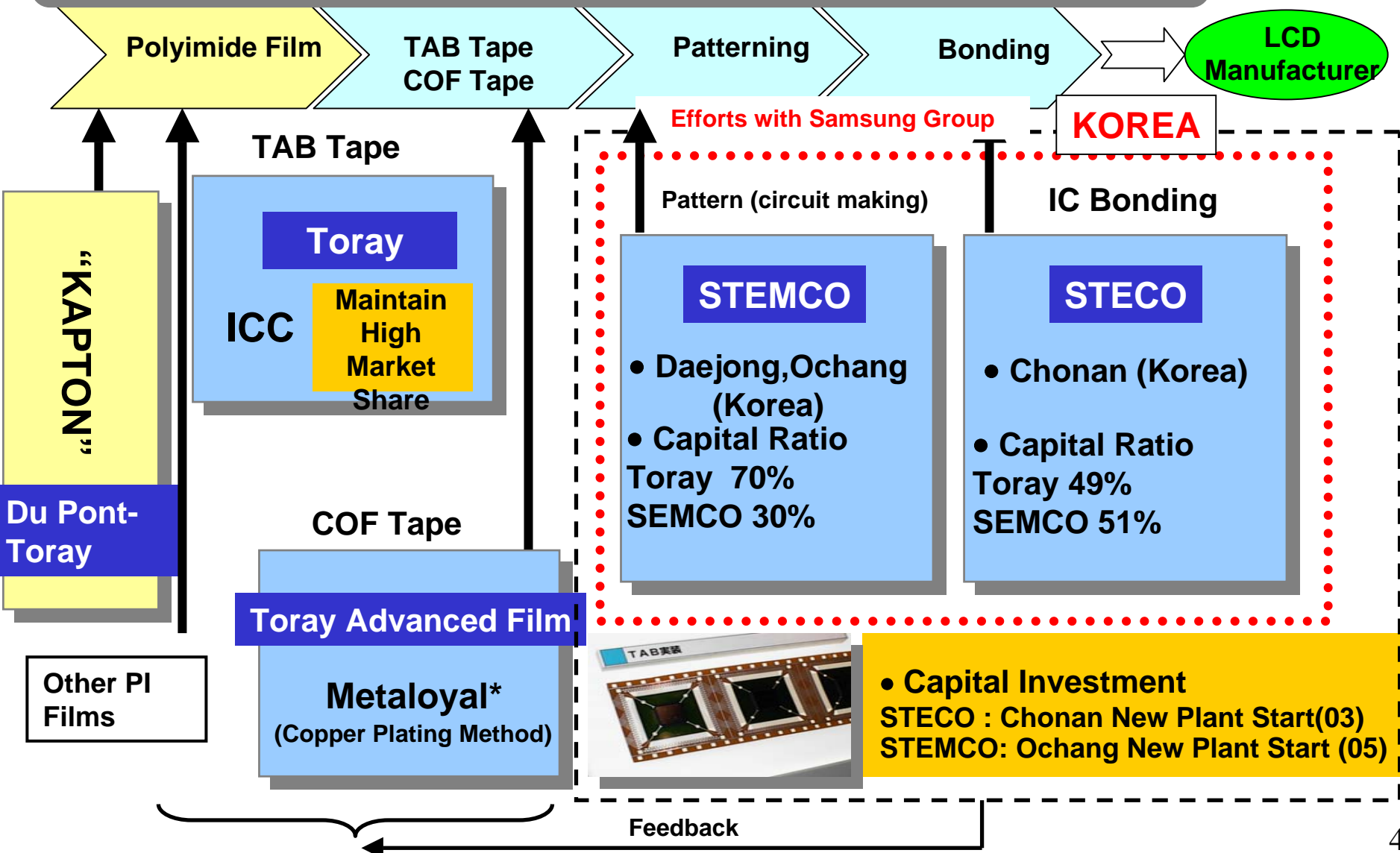
- ◆ Adopted semi-additive method, instead of subtractive method, which is useful for fine pitch patterning
- ◆ Developed an innovative technology for flexible circuit manufacturing which controls dimensional change during patterning process



3. Strategies for Display Materials – Business Strategies for Driver IC Bonding and Circuit Materials

**Business Infrastructure that Utilizes Circuit Bonding Technologies**

Development in various businesses with the value chain of LCD driver IC bonding market

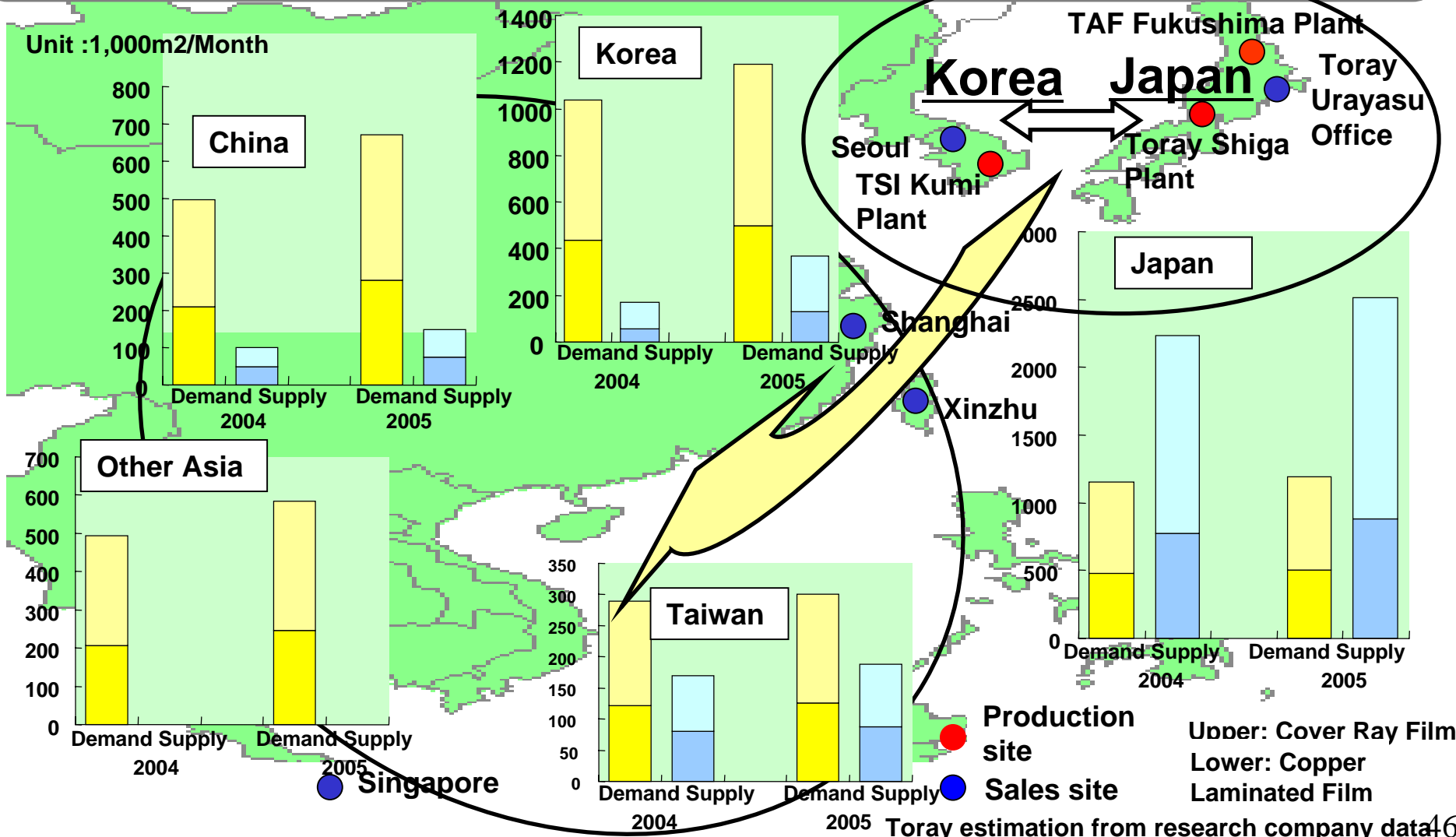


# 4. Business Strategy for Circuit-related Materials

## Global Strategy for Flexible Material Business



- With the expansion of demand for FPC to Asian market, demand and supply gaps in every region are expanding
- Korean market expands to 2<sup>nd</sup> biggest market just behind Japan

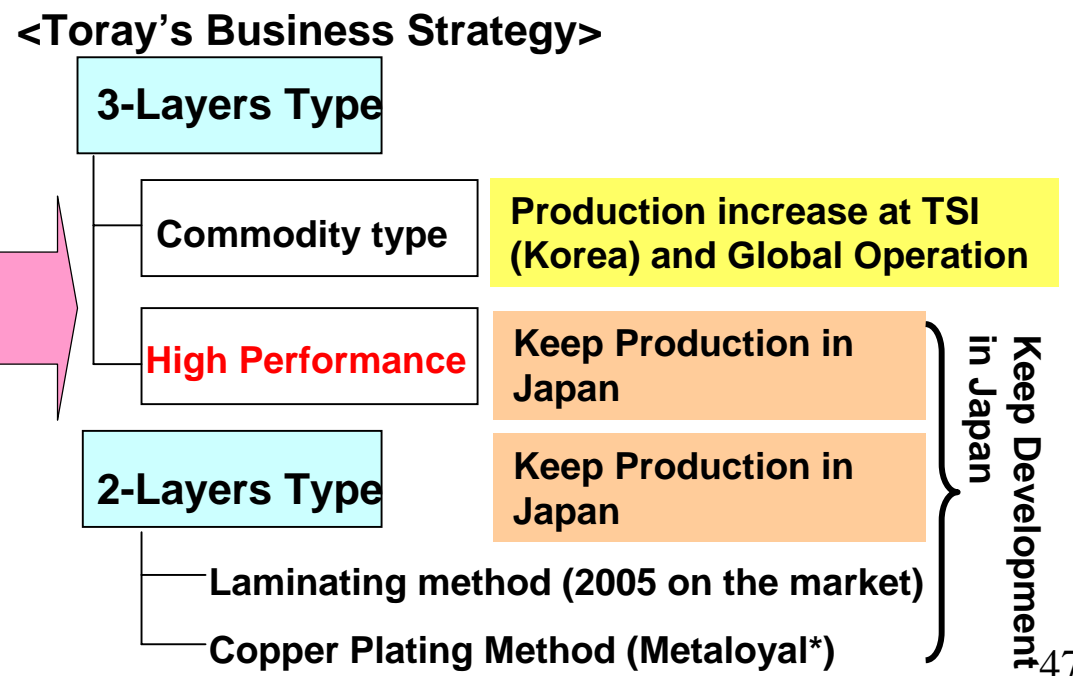
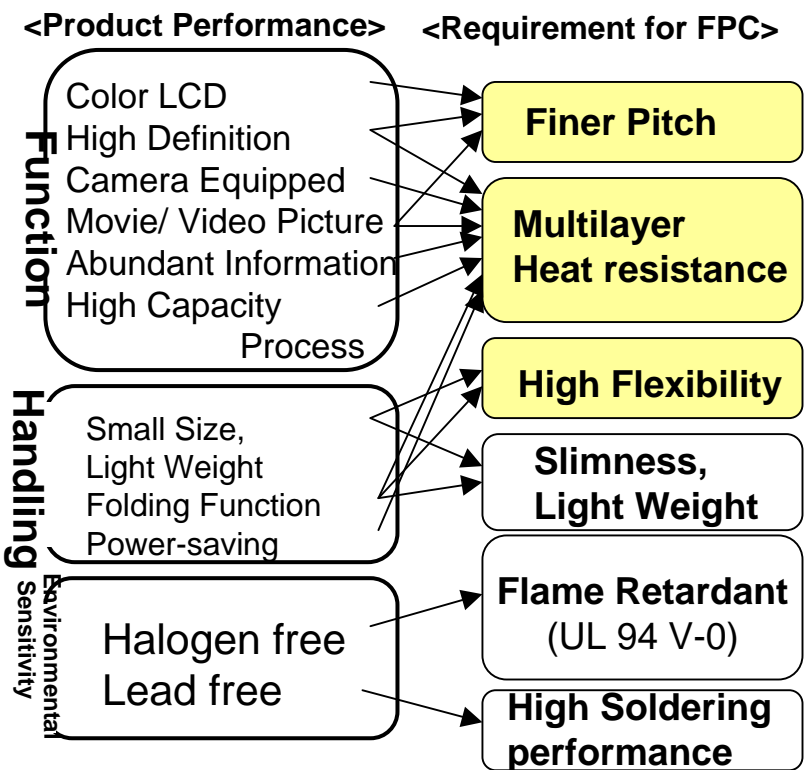
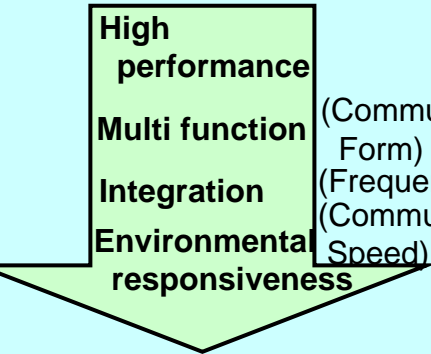
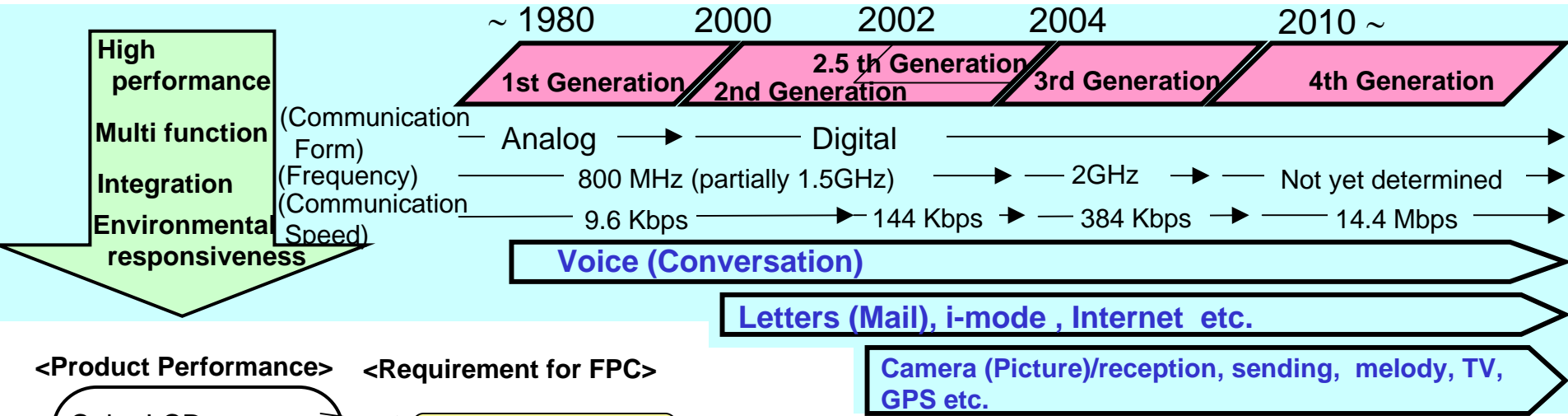


# 4. Business Strategy for Circuit-related Materials



## Technology trend for FPC applications and Toray's Strategy

### [ Transition and Roadmap for Cellular phone ]



# 4. Business Strategy for Circuit-related Materials

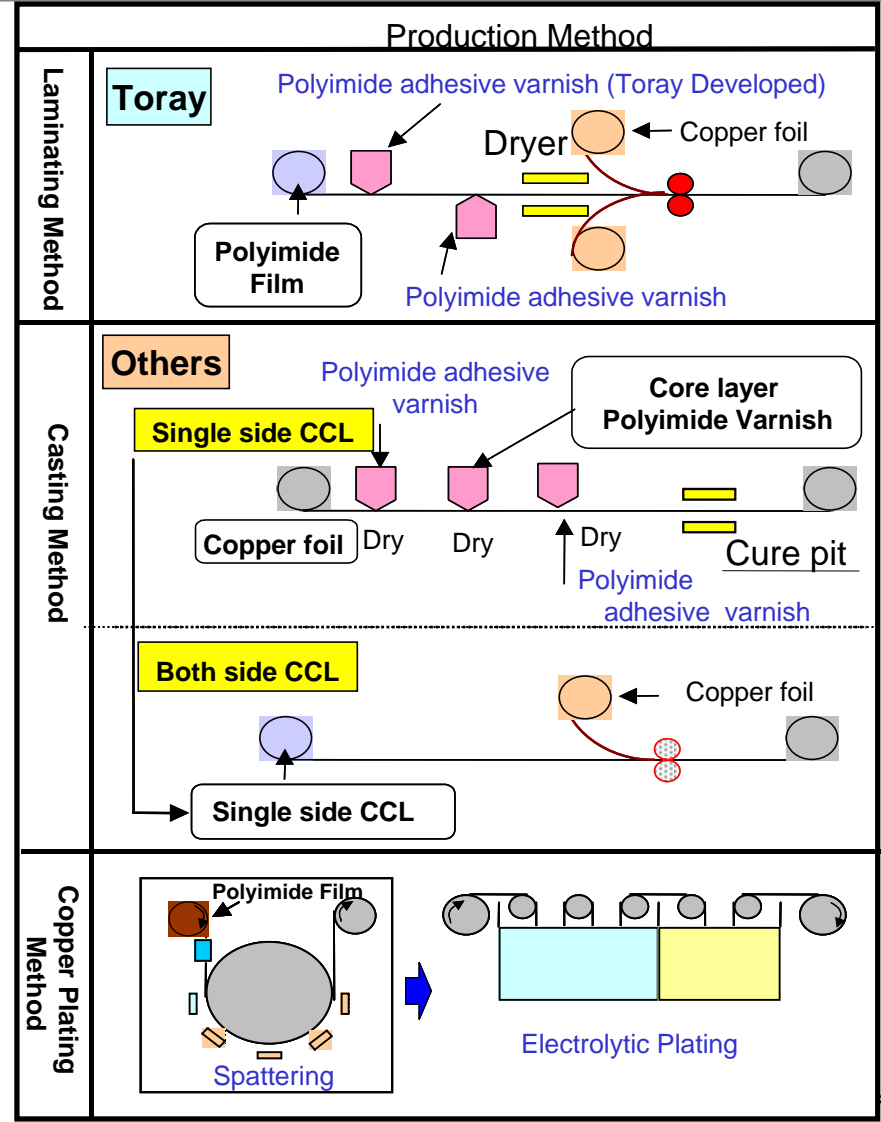


## Placing Laminating method 2-layers type material on the market

For high performance FPC applications, Toray will market laminating method 2-layers type materials

[Adaptation for High Flexibility/Multi Function/Multi Layer]

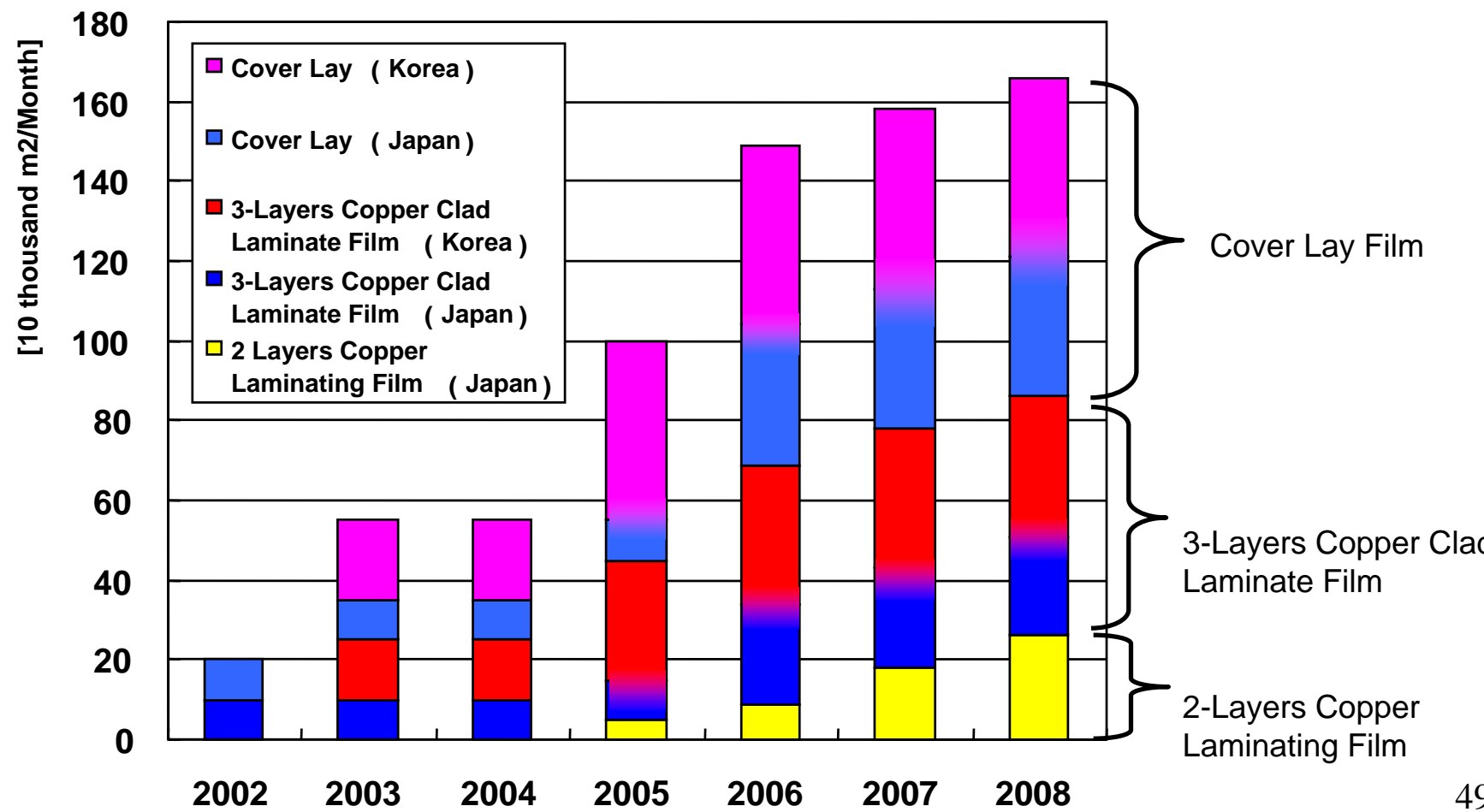
		Production Method		
		Laminating Method	Casting Method	Copper Plating Method
Requirements	Adhesive Strength	◎ (10N≤)	◎ (10N≤)	○ (10N≤)
	Multi-Layer FPC Properties (Heat resistance)	◎	◎	◎
	Flexible Properties	◎	◎	◎
	Fine Pitch	○	○	◎
	Dimensional Change	○ (± 0.02%)	○ (± 0.02%)	○ (± 0.02%)
	Cost	○	×	×





## Toray's FPC Materials Production Capacity Increase Plan

- Capacity increase in Japan and Korea and transport the products to all Asian countries
- Expansion in Korean market

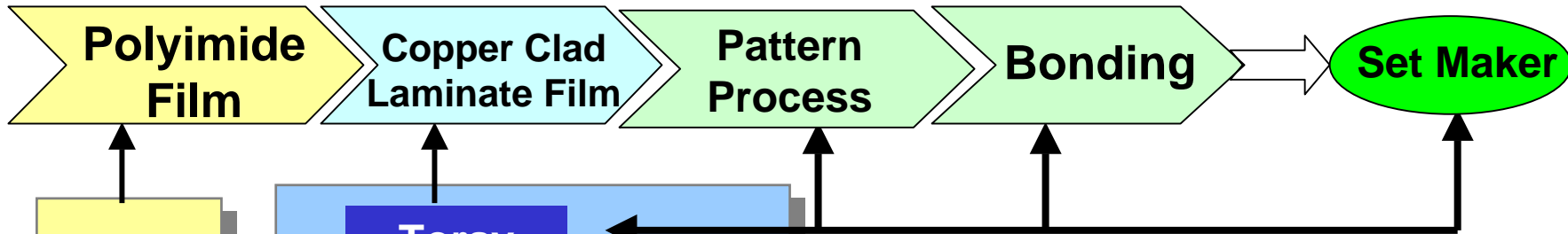


# 4. Business Strategy for Circuit-related Materials



## Business Infrastructure to utilize Flexible Circuit Materials

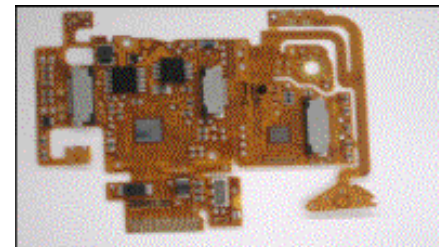
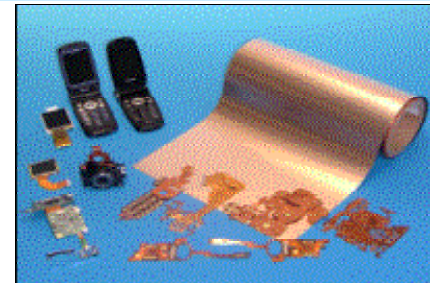
Quick response to expanding Asian Market :Expansion from Japan and Korea to All Asian countries



Collaboration



FPC Materials



(Example of Single side Copper Clad Laminate)



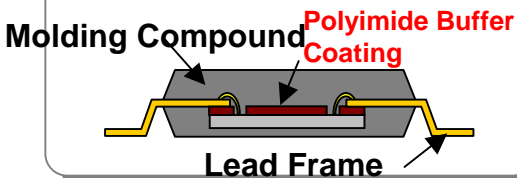
## Business Strategy for Semiconductor-related Materials

- Market expansion driven by high performance of photosensitive polyimide coatings for semiconductor
- Development of new application and supply of new materials

### Semiconductor applications

Protect Semiconductor Chip surface

Polyimide's Excellence in Heat resistance, Electric Insulation, and Mechanical Properties is suitable



### Polyimide types

Non-photosensitive

**Semicofine\***

Photosensitive

**Photoneece\***

Negative

<Unexposed area is developed>

Positive

<Exposed area is developed>

- Using photo-resist results in long process time
- Not Suitable for fine processing

(minimum 30 $\mu$ m)

- Organic Developer  $\rightarrow$  High Cost
- Enables partially fine processing

(minimum 10 $\mu$ m)

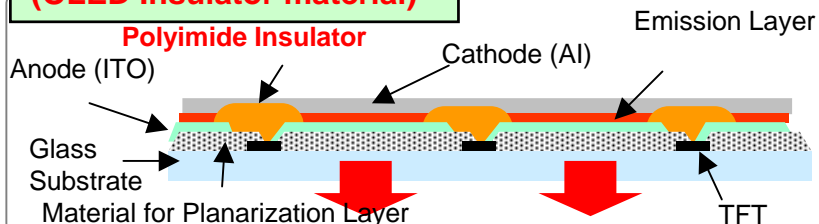
- Enable use of aqueous developer
- Suitable for fine processing

(minimum 3 $\mu$ m)

Expansion of applications

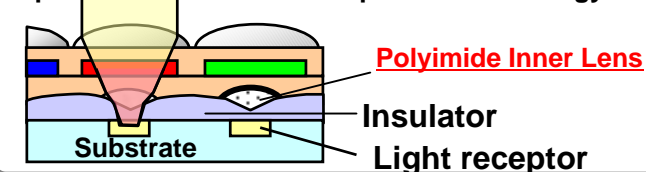
### New applications

Display application  
(OLED Insulator material)



Optical Device application  
(CCD lens material)

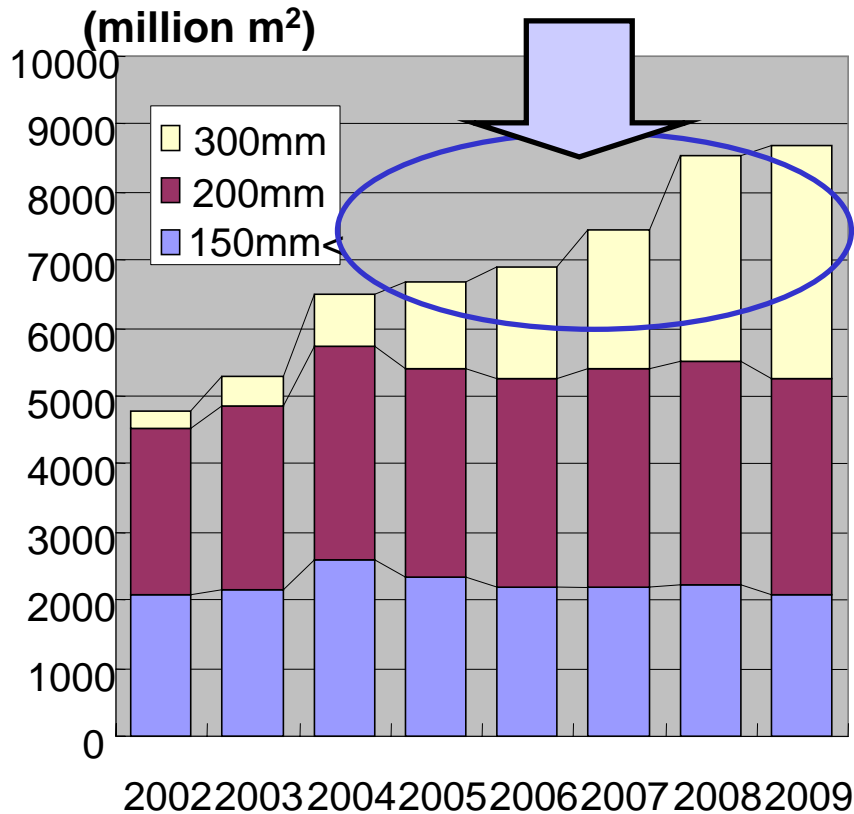
Optical function + Nano dispersion technology



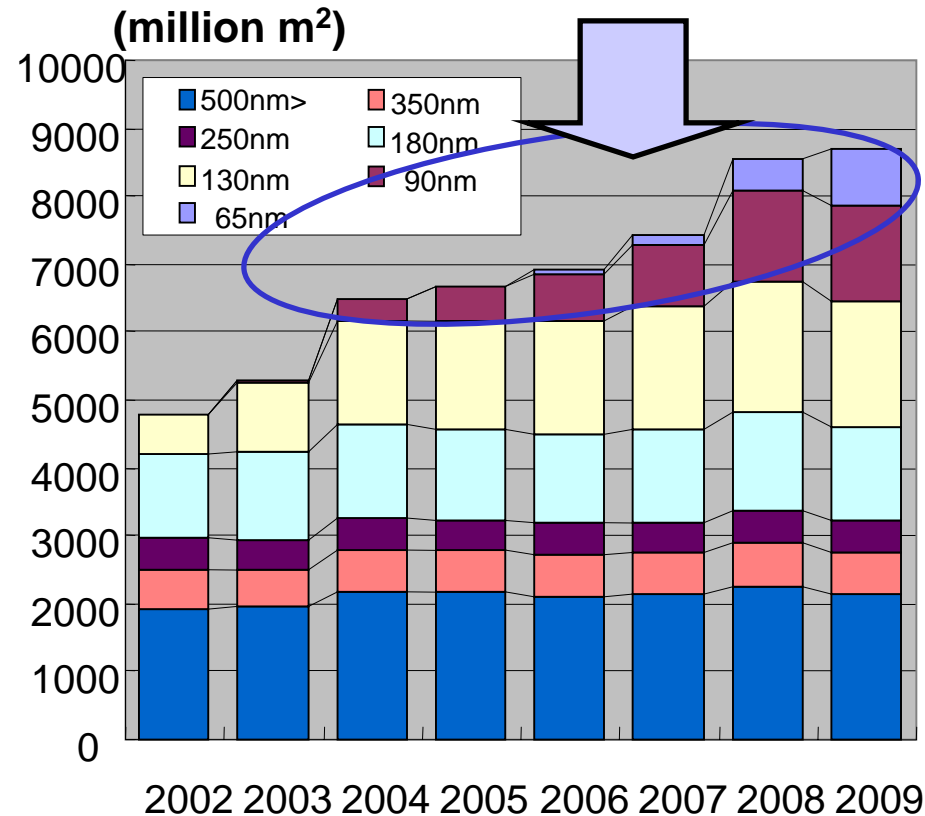
# Semiconductor Market Trend

Expand investments for large diameter wafer (300mm), fine pitch pattern (90nm, 65nm)  
 → Aim sales expansion by responding to large diameter wafer and fine line width

FAB. Capacity By Wafer Size



FAB. Capacity By Line Width


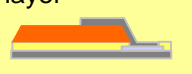


# 5. Business Strategy for Semiconductor-related Materials



## Semiconductor Technology Trend and Requirements for Polyimide Coatings

Expanding market share by seeing beyond today's technology trends and expanding sales of **“Positive Photosensitive Polyimide Coatings”**, which are suitable for large diameter wafer and fine line width

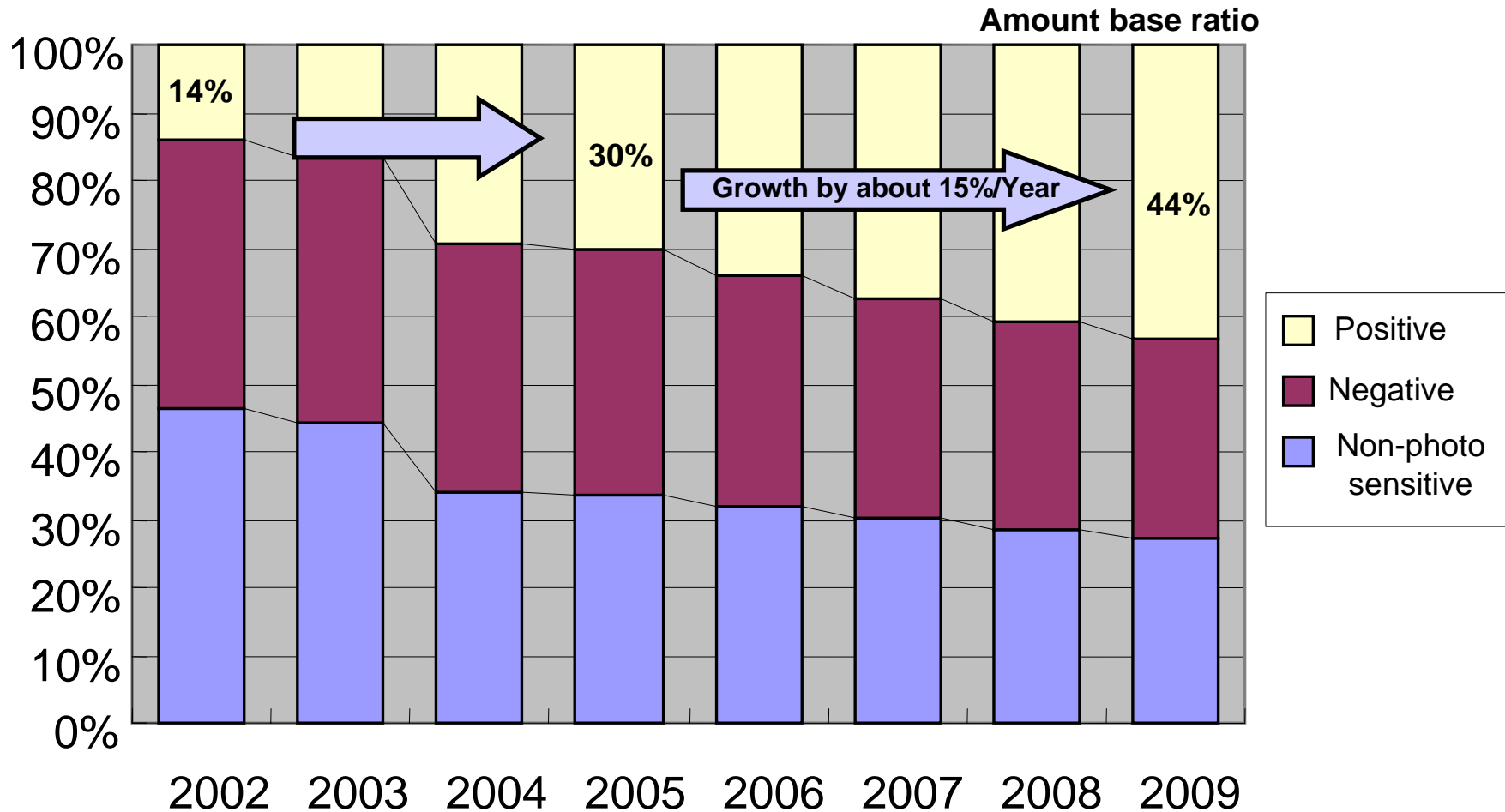
Requirements for Polyimide Coatings	Key Issue	Comparison of Polyimide Coatings		
		Non Photosensitive	Negative Photosensitive	Positive Photosensitive
<b>Semiconductor advanced technology trend</b> Large wafer size (Diameter 300mm) Wiring rule fine pitch (90nm,65nm)	Improve coating consistency • Improve wet property of wafer surface • Stabilization in drying	Difficult	Moderate	<b>Easy</b>
	Fine pitch of Polyimide pattern Improve consistency of pattern inner Cross linkage mechanism	~20 $\mu$ m	~10 $\mu$ m	~3 $\mu$ m
<b>Semiconductor package technology trend</b> High Density Inter-connect (IC Package with bumps, WLP)	Smooth feature Improve pattern feature by variety of photo reaction mechanism		Easy to break re-routing conductive layer 	Not Easy to break re-routing conductive layer 
<b>Other Market Needs</b>	Reduction of Environment impact	Aqueous Development	Organic Development	<b>Aqueous Development</b>
	Low Cost (photo development cost)	Low	High	<b>Low</b>
	Short TAT*	Long	Short	<b>Short</b>

\* TAT: Turn Around Time

# Market Share of Semiconductor Polyimide Coatings by type

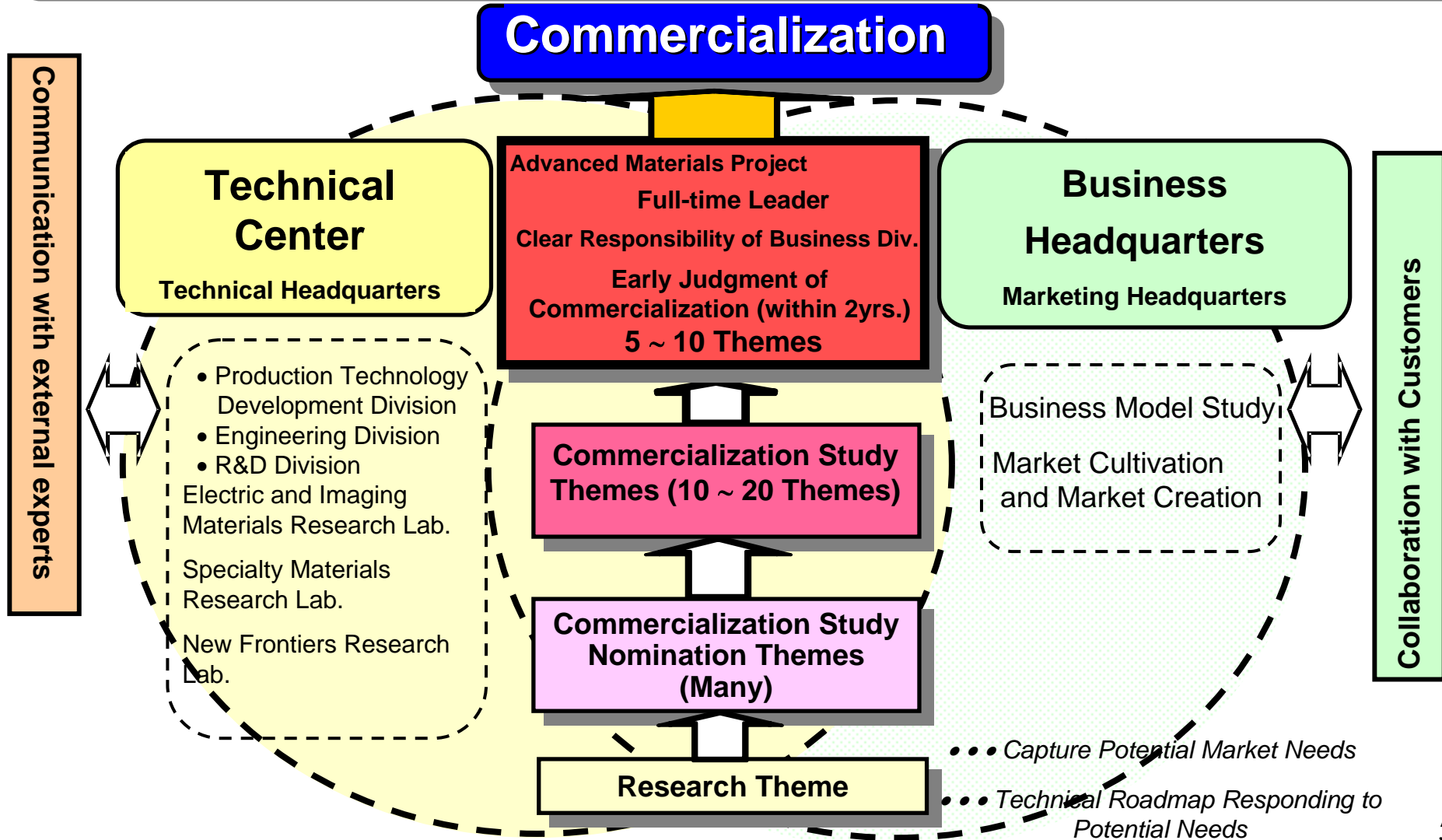
Positive type share increases steadily and positive type accounts for half of the semiconductor polyimide materials market

→ Toray expands market share in positive type polyimide coatings



# New System for Business Creation

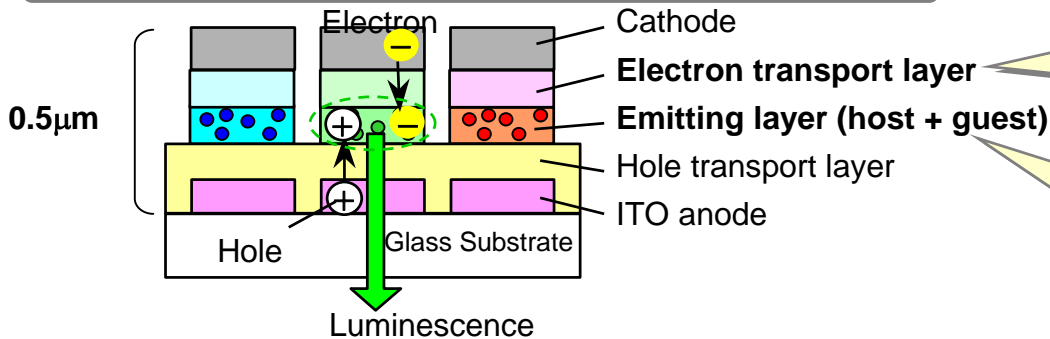
- Business development speed priority
- Flexible infusion of talent
- Technology development and business creation by emphasizing customer requests
- Collaboration between Technical Center and Business Headquarters



## Low Molecular Organic EL Materials

- Market in by **Red Light Emissive Material** with summit-level color purity and high efficiency, and **Electron Transport Material** with low drive voltage.
- Under Development of **Blue Light Emissive** and **Phosphorous Light Emissive Materials**. Aim for Organic EL material manufacturer.
- Market Size (2008) : 10 billion yen

### Organic EL Structure and Toray-developed Materials



#### Electron Transport Material :

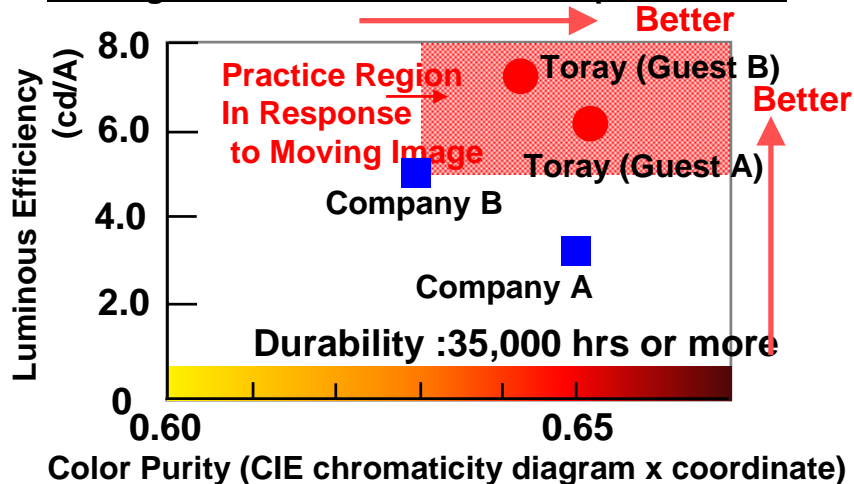
Low driving voltage and high color purity

#### Red Light Emissive Materials :

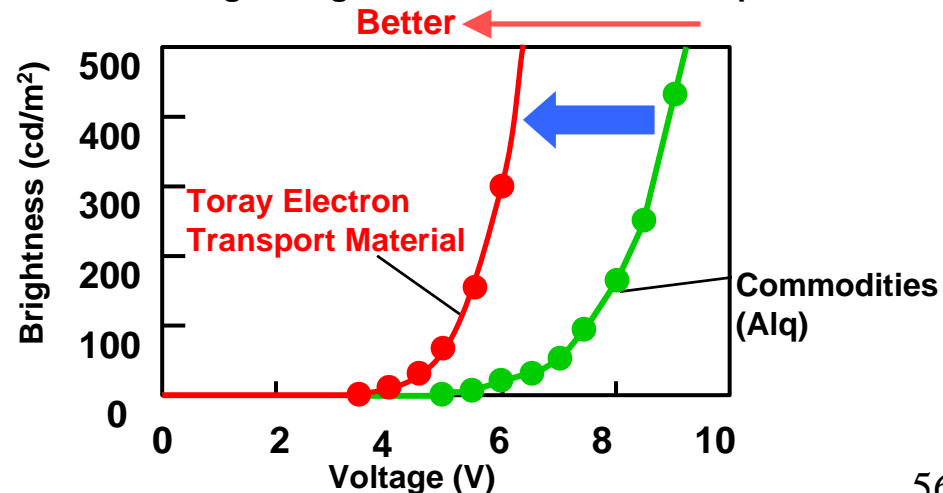
High Color Purity, High Efficiency and Long Lifetime

### Properties of Toray Organic EL Materials

#### Red Light Emissive + Electron Transport Material



#### Low Driving Voltage Effect of Electron Transport Material



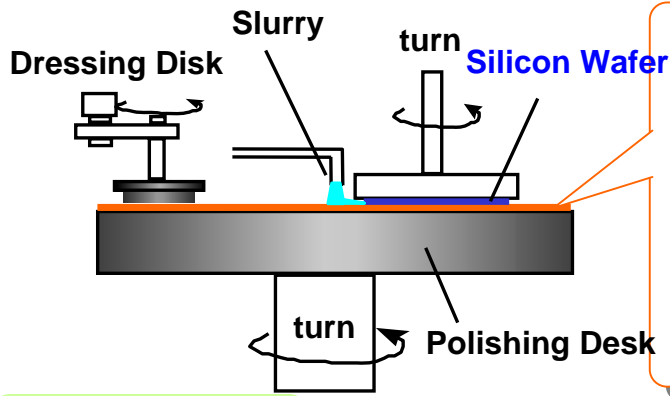


# CMP – Chemical Mechanical Polishing – Pad

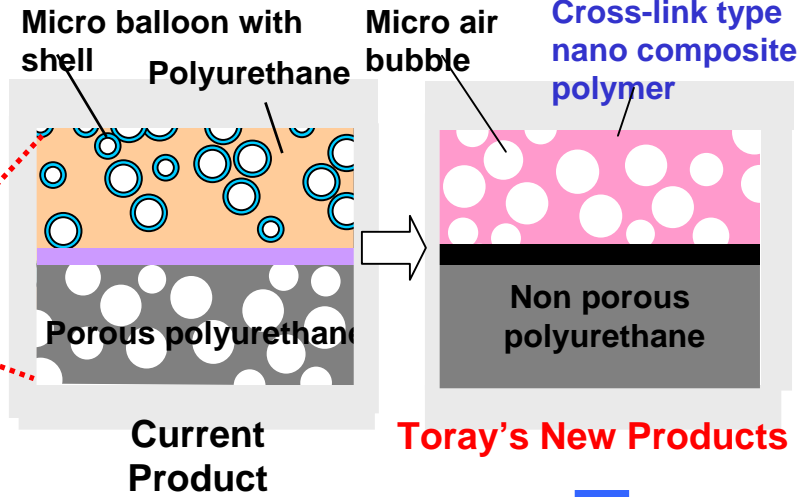
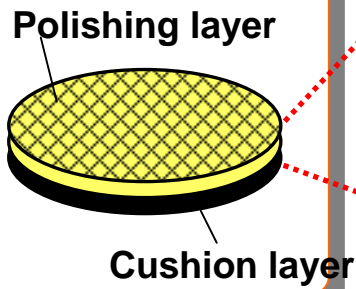
- Developed new CMP Pad which can be a substitution of a monopolistic product
- Market Size (2008): 50 billion yen

## CMP

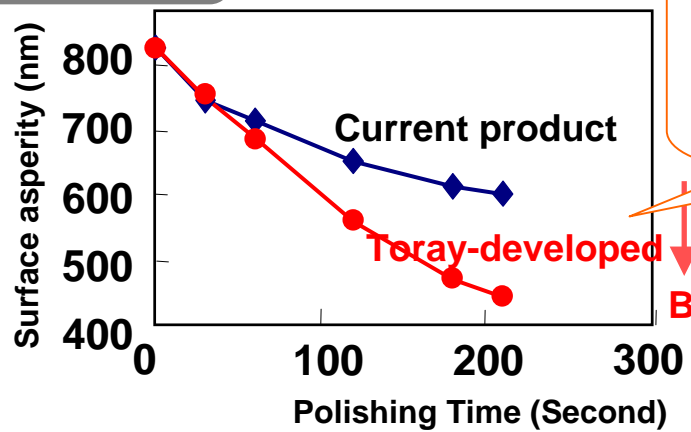
(core process for semiconductor production)



### Polishing Pad



## Property Comparison



- High Polishing Speed
- Excellent Uniformity
- Less Defects
- 300mm applicable

## Creative Technology

- ◆ Process-adaptability by polishing layer hardness-control
- ◆ Patent acquired (U.S and Taiwan)

# Summary

## Information and Communication Field

Market Expansion by integration of Digital, Network, and Communication Technology

Huge Global Expansion

Appearance of BRICs Market

Rapid Product Maturization

Outlining Change



Handling Change

## Demand Creating Marketing

Exposing Hidden Demand by outstanding advanced technology  
(Demand Creation by technology push)

Strengthening Vertical Integrated Cooperation with upstream and downstream companies

(Offer advanced materials to the market by built-in)

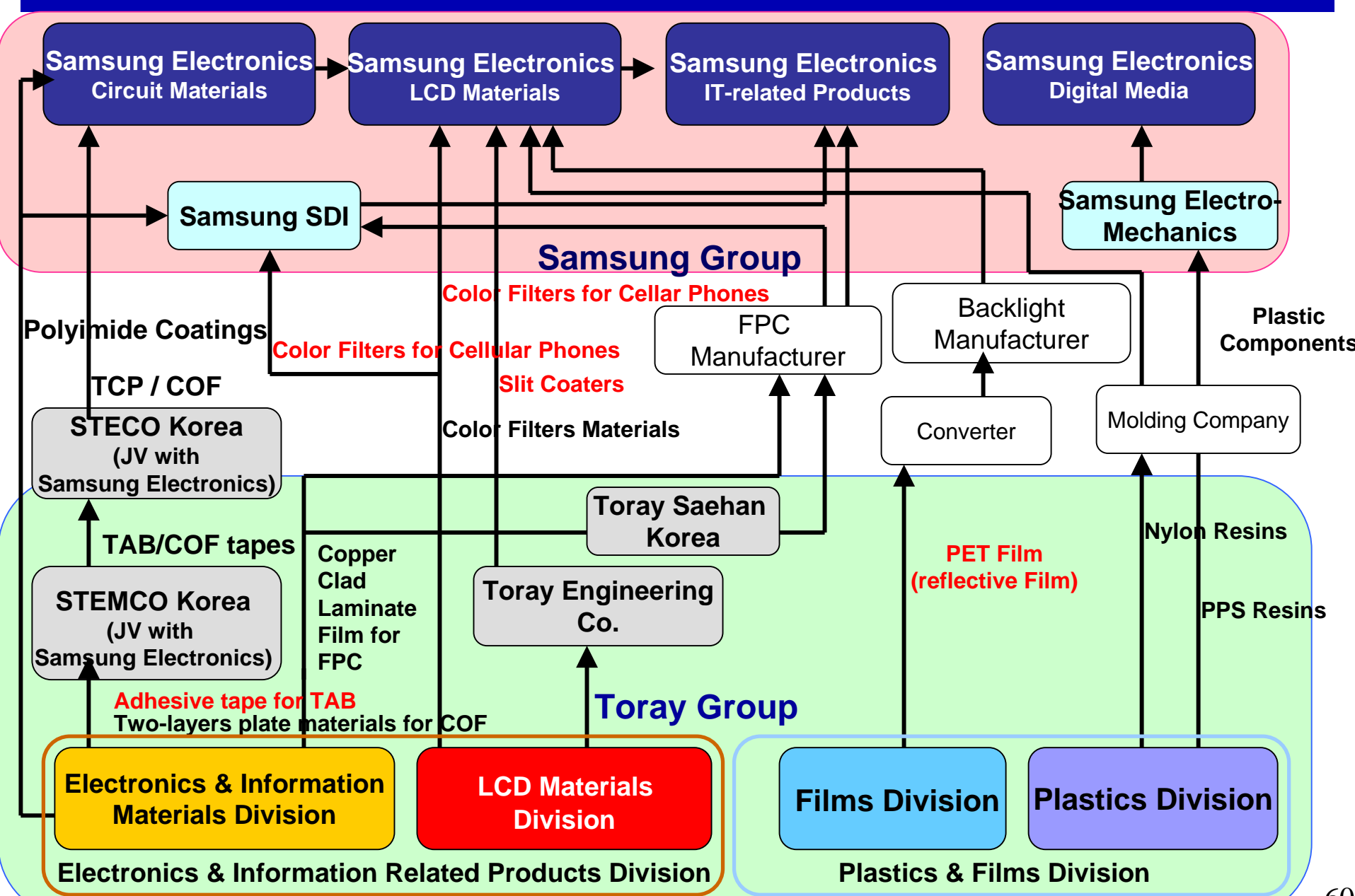
Acceleration of win-win efforts with most appropriate customers in value chains



Offer continuously high performance materials, technology and know-how to the customers

IT-related Products Segment is a driver of "Toray's Advanced Materials"

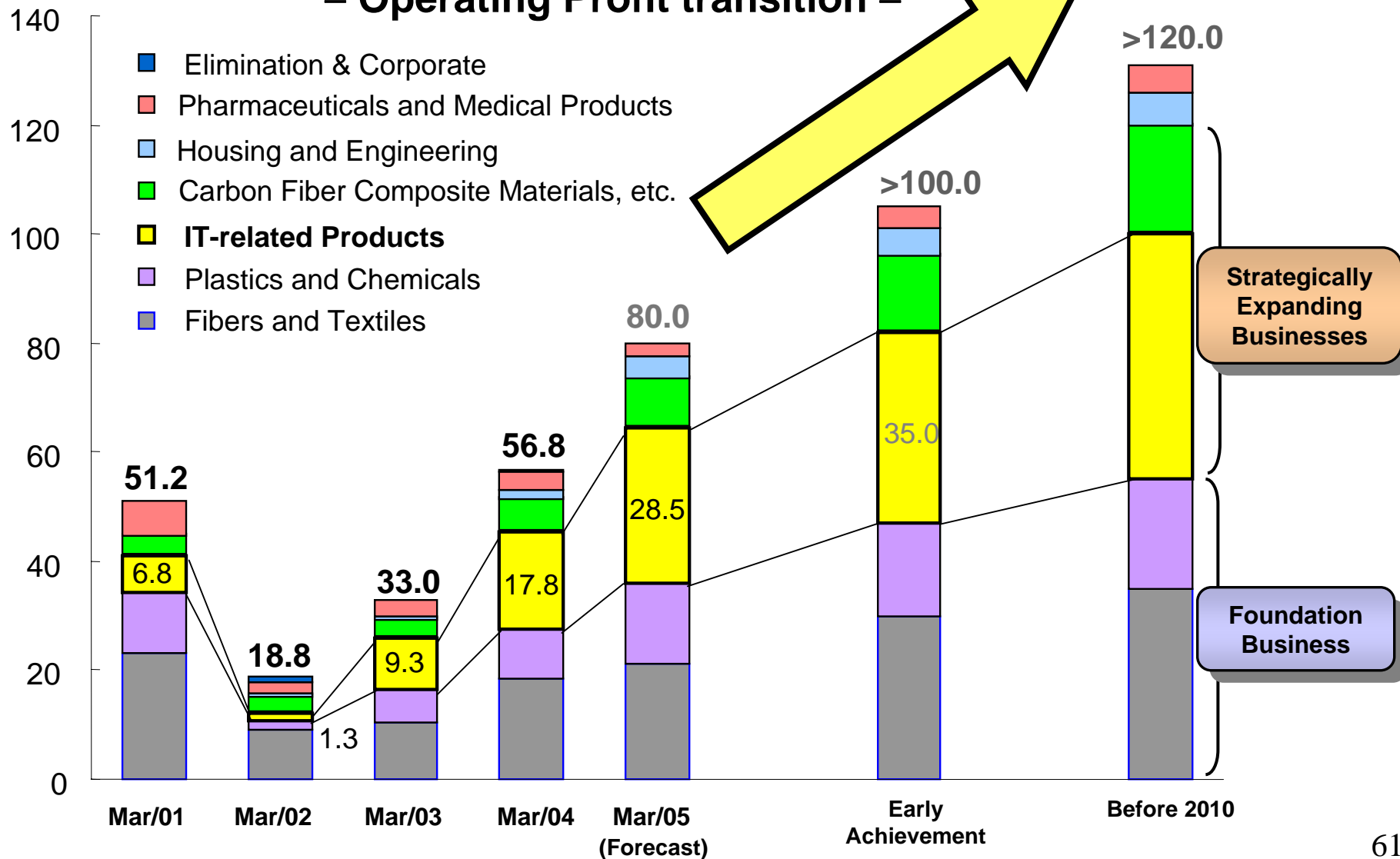
# Strong Collaboration with the Samsung Group



## Accelerating profit expansion by Business expansion

Billion ¥

– Operating Profit transition –



Descriptions of predicted business results, projections, and business plans contained in this material are based on predictive forecasts of the future business environment made at the present time.

The material in this presentation is not a guarantee of the Company's future business performance.

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