HIGH-PERFORMANCE FILM MARKET 2011

-Market Prospects and Strategies-

Yano Research Institute Ltd.

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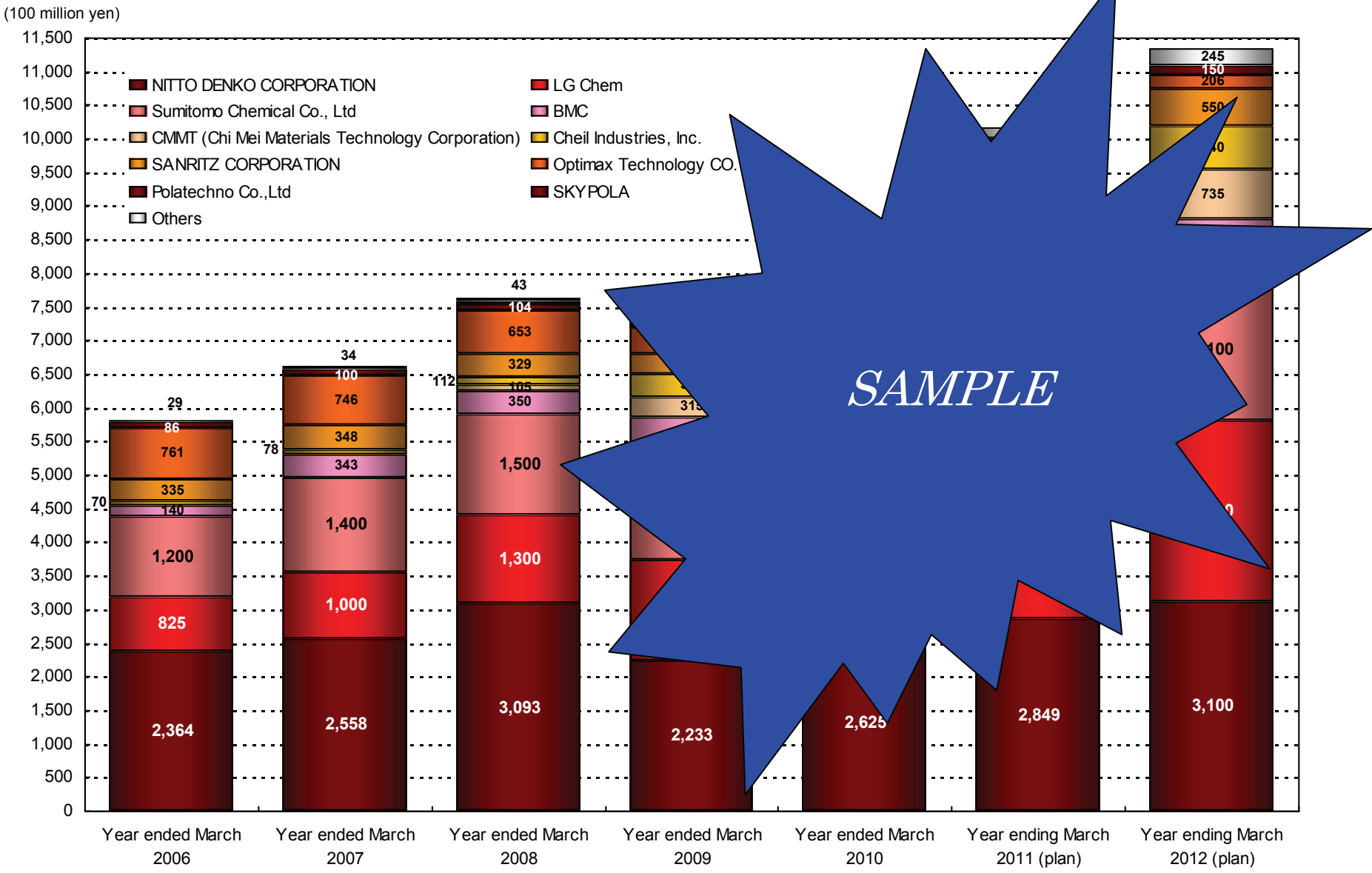
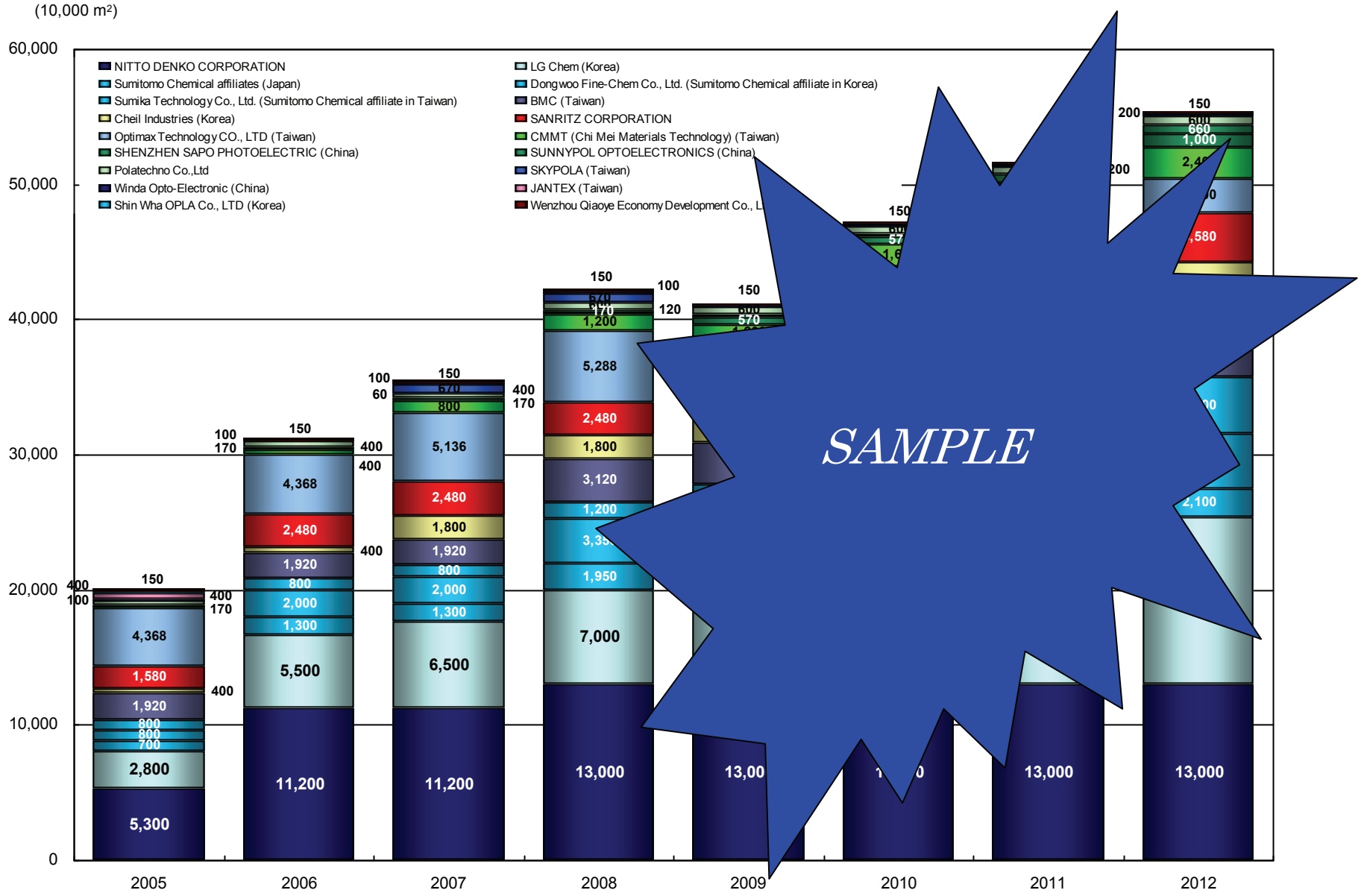
1-1-1. Annual Sales of Polarizer Manufacturers (Polarizer Business)



1-1-3. Production Capacity and Shares of the World's Major Polarizer Manufacturers



1-1-4. Production Volume and Sales of Polarizers by LCD Type

(Unit: 10,000 m²/year)

	FY2008	ratio	FY2009	ratio	FY2010	ratio	FY2011 (forecast)	ratio	FY2012 (fore	ratio	FY2013 (forecast)	ratio
TFT	22,76	97.2%	2		4,51	96.7%	4	96.8%			50	97.1%
STN	285					2.6%	1	3.4%			00	2.3%
TN	370											
Total												00.0%
Year-on-year ratio												0.6%
Sales in Valu (100 million											12,600	
Average unit price (yen/m²)					2,8						3	
Year-on-year ratio					94.8%				0%		95.0%	

* Based on Roll.
* Sales include products other tha arizer g. ITO film and optical components).
* Average unit price = (Sales in va Production volume)
* Year-on-year ratio for 2012 and is assumed as 95%.

1-1-7. Production Volume by Polarizer Manufacturer and LCD Mode in 2012 (Forecast)

(Unit: 10,000 m²/year)

Manufacturers	Capacity	TN		STN		TFT		Total	
			share		share		share		share
NITTO DENKO CORPORATION	13,000	-		-	-	11,000	24.1%	000	23.4%
LG Chem	12,400				-	11,000	24.1%	000	23.4%
Sumitomo Chemical Co., Ltd	0,000			-	-	7,400	6.2%	400	15.7%
BMC				-		4,500		500	9.6%
CMMT						3,80			8.1%
SANRITZ CORPORATION									
Cheil Industries, Inc.									
Optimax Technology CO.									1.7%
Polatechno Co.,Ltd				00					1.2%
SUNNYPOL OPTOELECT									.2%
SHENZHEN SAPO PHOTOELE									0.8%
Winda Opto-Electronic									0.4%
Wenzhou Qiaoye Economy Development Co., Ltd			6.9%	100				120	%
Total	,070	290	100.0%	1,080			%	030	100.0%
ratio		0.6%						100.0%	

Note) Production volume is based on Roll, computed in consideration of production capacity, operation pe d rat d other factors.
STN includes applications for 3D glasses.

[Estimated by Yano Research Institute]

1-1-10. Comparison of Production Rate of Polarizer Manufacturers

	Plant/Line	2008	2009	2010	2011	Target
		(per minute)				
NITTO DENKO CORPORATION	Existing line	20 m	20 m	20 m	20 m	30 m
	New Onomichi process (2 lines)	25 m	25 m	27 m	27	30 m
Sumitomo Chemical Co., Ltd	Existing line	15 - 16m	15 – 16 m	18 m	1	2
	With the latest technology (Ehime)	18 m	18 m	20 m		
Dongwoo Fine-Chem	(1)	12 m	12 m	12 m		
	(2)	18 m	18 m			
	(3)(4)(5)					0 m spec
Sumika Technology	(1)(2)	18 m	18 m			
LG Chem	(2) – (7)	18 m	18 - 20 m			
	(8) – (10)					
BMC	(1)	12 m	1			
	(2)(3)(4)	(2) 12 m (3) 16 m	(2) 12 m (			0 m
	Tainan (8)(9)					to 2012)
SANRITZ CORPORATION	Toyama (1)(2)	8 - 10 m	8 – 12 m			
	Nyuzen (3)	12 m	12 –			ptly expand (3) dle 18 to 20 m
Cheil Industries, Inc.		12 m				
						m
CMMT	(1)(2)(3)	6 – 8 m	13			
	(4)					(4) 20 m
Polatechno Co.,Ltd	(1)(2)	10 m	10 m			
	(3)		1		5 m	
Optimax Technology CO.		10 – 12 m	1		– 12 m	16 m
SHENZHEN SAPO PHOTOELECTRIC	(4)				12 m	
SUNNYPOL OPTOELECTRONICS	(3)				12 m	
Winda Opto-Electronic	(1)(2)				5 m	
Wenzhou Qiaoye Economy Development Co., Ltd	(1)				Max: 10 m	

[Estimated by Yano Research Institute]

1-1-11. Wide Line Operations of Polarizer Manufacturers

Name of Manufacturer	Operation Period	Production Sites	Lines	Width	Operation Status
NITTO DENKO CORPORATION	June 2008	Onomichi	No. 6 line	0 m	
LG Chem	March 2009	Ochang			n full operation 80% production for
	August 2010	Ochang			operation 0% production for idth.
	Scheduled to start operation at the end of 2012.	Ochang			-
Dongwoo Fine-Chem	April 2009	Pyeongtaek P Iksan City			full operation uction for 60 mm width.
Sumika Technology	2012?	Tainan		nm	-
BenQ Materials Corp.	June 2009	Guishan Township, Taoyuan County	. 4 line	1,960 mm	Facility is in full operation with 40% production for 1,960 mm width.

[Estimated by Yano Research Institute]

1-3-10. Annual Sales Volume of Retardation Film for 3D Glasses

(Unit: 10,000 m²/year)

	FY2007		FY2008		FY2009		FY2010		FY2011 (forecast)		FY2012 (forecast)	
		share		share		share		share		share		share
TEIJIN CHEMICALS LTD.	50	100.0%	60	100.0%	60	75.0%						62.5%
KANEKA CORPORATION	-	-	-	-	20						150	37.5%
Total	50	100.0%	60	100.0%	80	100					00	100.0%

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- Chinese manufacturers are the primary suppliers ... in mo... theaters. TEIJIN CHEMICALS and KANEKA are t... uppliers in this segment.
- TEIJIN CHEMICALS took advantage of its relationship... e po...rizer manufacturers fostered through dealing in STN and was quick to unde... this ...plication before KANEKA.
- People will soon have their personal 3D glasses at mov... heaters. As consumer glasses must offer good design, curving process is applied on the len... In the curving process, which involves applying heat of about 110 degrees centigrade, polycarbonate film is not suitable due to the inconsistency formed given the photoelastic coefficient. This is why COP is applied although it is vulnerable to oil and hence for example, touching the lens after eating potato chips can cause the lens to crack. Hence the hard coat layer is added. Generally, COP does not offer high adhesiveness with other materials and requires surface processing. With costs associated with resin, surface processing and hard coating, the product becomes quite expensive compared to PC-based retardation film. This is a major drawback.

1-3-19. Status of Material Manufacturers for iPhone 4

Status of Component Manufacturers for iPhone 4 (2010)

3.5" Panel IPS		Polarizer	Retardation films *			
			Upper		Lower	
	hare		(1)	(2)	(3)	(4)
TMD (Toshiba Mobile Display Co., Ltd.)				Sekisui Chemica		None
LGD (LG Display Co., Ltd.)	5				ION	
Seiko Epson Corp.						

* Composition of cell: polarize
(1) NV film 13 μm (positive c-
100% share for both polarizer a

[Estimated by Yano Research Institute]

3.5" Panel IPS						
						(4)
TMD		mitom emical Co., Ltd	JX Nipr		RPORAT ON	None
LGD						
SHARP CORPORATION	%	NITTO DENKO (partially)	NITTO DI	NA-Z)	COP-based	None
CIC	15%					

[Estimated by Yano Research Institute]

1-3-20. Status of Component Manufacturers for iPad

Status of C… …facturers for iPad (2010)

9.7" Panel IPS	shar…	…rize…	Retar… …ion films
LGD	…s		FUJ… …l (Z-TAC)
Samsung Electronics Co.,L…			…ca M… …pto (Ze…-TAC)
Seiko E…		…a	…pto … …ero-TAC)

* Composition of cell: p…

…esearch Institute]

9.7" Panel IPS			…er
LGD		…O …KO …RPORA…ION	…IFILM… …AC)
Samsung Electronics Co.,Ltd		NITTO DENKO CORPORATION	Z… …CORPORATION (G film)

* Sumitomo Chemical is expected to enter the market in the latter half of 2011. LGD and Sa… …ct… …each ho… 50% share. ZEON is strong in retardation film (G film).
LG Chem will also enter the market of lower polarizers in the latter half of 2011. FUJIFILM (…) handles retardation film while NITTO DENKO handles upper polarizer.

[Estimated by Yano Research Institute]

1-5-2. Shares of PET Protect Film Manufacturers at LCD Polarizer Manufacturers

Polarizer Manufacturers	Protect Film Manufacturers	FY2009	FY2010	FY2011 (estim)	Remarks
NITTO DENKO CORPORATION	In-house	85%	95%	9	
	FUJIMORI KOGYO CO., LTD.	15%	5%		
SANRITZ CORPORATION	FUJIMORI KOGYO CO., LTD.	90%	9		
	SUN A KAKEN Co., Ltd.	10%			
Sumitomo Chemical Co., Ltd	FUJIMORI KOGYO CO., LTD.	80%			
	NITTO DENKO CORPORATION				
	LINTEC Corporation				
	SUN A KAKEN Co.,Ltd.				
Polatechno Co.,Ltd	FUJIMORI KOGYO CO., LTD.				
	LINTEC Corporation				
Optimax Technology	SUN A KAKEN Co., Ltd.				
	NITTO DENKO CORPORAT				
	FUJIMORI KOGYO CO., LTD.				
	Teijin DuPont Films Japan Limited				
LG Chem	In-house				
	SUN A KAKEN Co., Ltd.				
	FUJIMORI KOGYO CO., LTD.				
Cheil Industries (former ACE DIGITECH)	OSUNG LST Co., Ltd.				
	Youl Chon Chemical, Ltd.				
	FUJIMORI KOGYO CO., LT				
BenQ Materials Corp. (former DAXON)	FUJIMORI KOGYO CO., LTD.				Co ng starting production of protect film within the Group
	OSUNG LST Co., Ltd.				
	LINTEC Corporation				
CMMT (Chi Mei Materials Technology)	FUJIMORI KOGYO CO., LTD.			6	
	SUN A KAKEN Co., Ltd.			-	
	NITTO DENKO CORPORATION		0%	40%	
Winda Opto-Electronic	FUJIMORI KOGYO CO., LTD.		80%	80%	
	SUN A KAKEN Co., Ltd.		20%	20%	
SHENZHEN SUNNYPOL OPTOELECTRONICS	FUJIMORI KOGYO CO., LTD.		100%	100%	
	OSUNG LST Co., Ltd.	-	-	Partial	
Wenzhou Qiaoye Economy Development Co., Ltd	SUN A KAKEN Co., Ltd.	Partial	100%	100%	

[Estimated by Yano Research Institute]

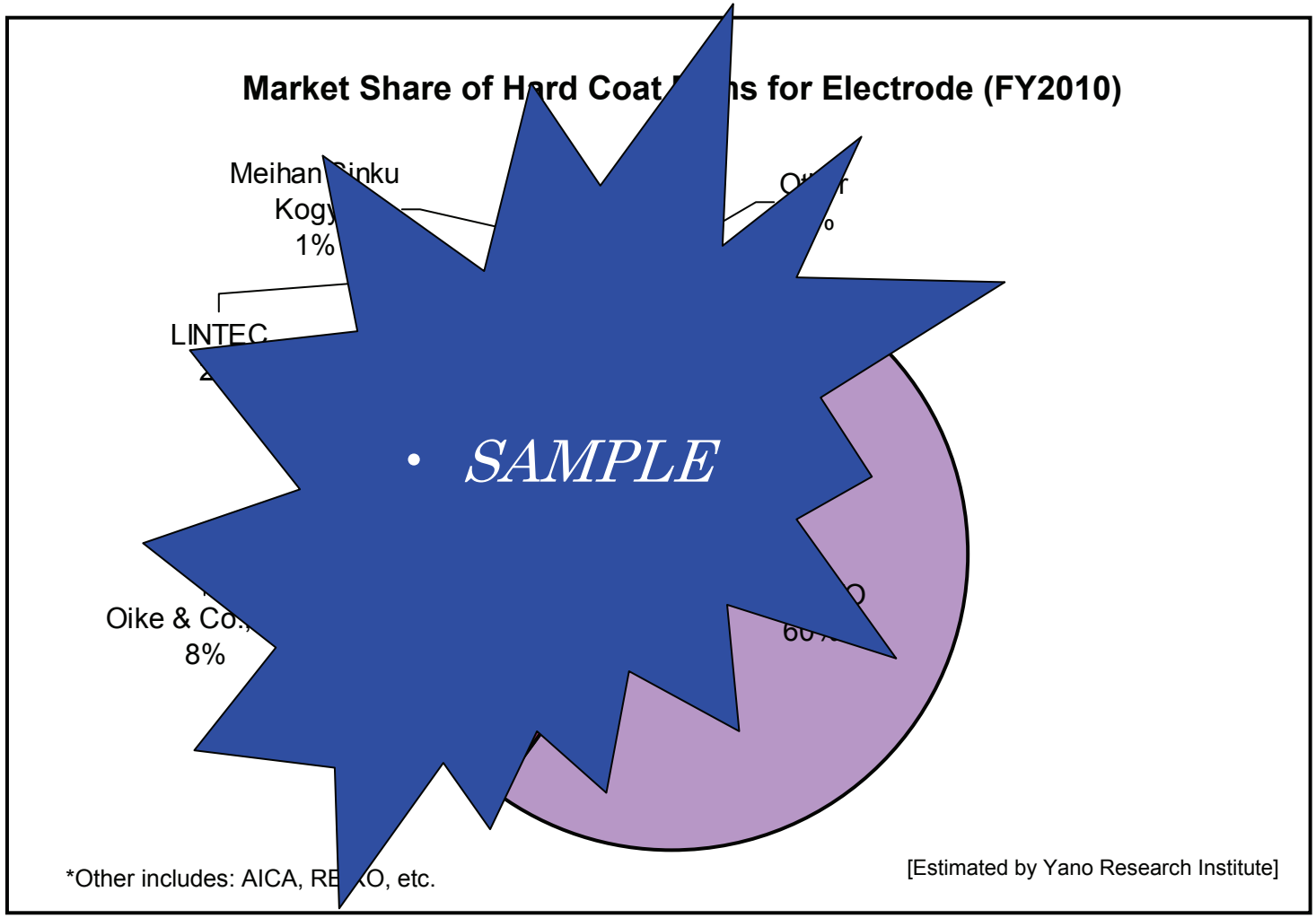
1-5-5. Shares of Release Film Manufacturers at Leading Polarizer Manufacturers

	Manufacturers	FY2008	FY2009	FY2010	FY2011 (estimate)
NITTO DENKO CORPORATION	MITSUBISHI PLASTICS, Inc.	70%	70%	70%	70%
	Toray Industries, Inc.	30%	30%	30%	30%
Sumitomo Chemical Co., Ltd	LINTEC Corporation	100%	100%		100%
SANRITZ CORPORATION	Teijin DuPont Films Japan Limited	80%	Partial		-
	MITSUBISHI PLASTICS, Inc.	20%			100%
Polatechno Co.,Ltd	LINTEC Corporation	90%			
	Teijin DuPont Films Japan Limited				
Optimax Technology CO.	Teijin DuPont Films Japan Limited				-
	MITSUBISHI PLASTICS, Inc.	30%			
	Nan Ya Plastics Corporation				20%
LG Chem	MITSUBISHI PLASTICS, Inc.				50%
	Toray Advanced Materials Korea, Inc.				
ACE DIGITECH (Cheil Industries)	MITSUBISHI PLASTICS, Inc.	20			-
	Toray Advanced Materials Korea, Inc.			100%	100%
DAXON (BenQ Materials)	MITSUBISHI PLASTICS, Inc.	100%	100	100%	100%
CMMT	MITSUBISHI PLASTICS, Inc.	80%	80%	100%	100%
	Toray Industries, Inc.	20%	20%	-	-

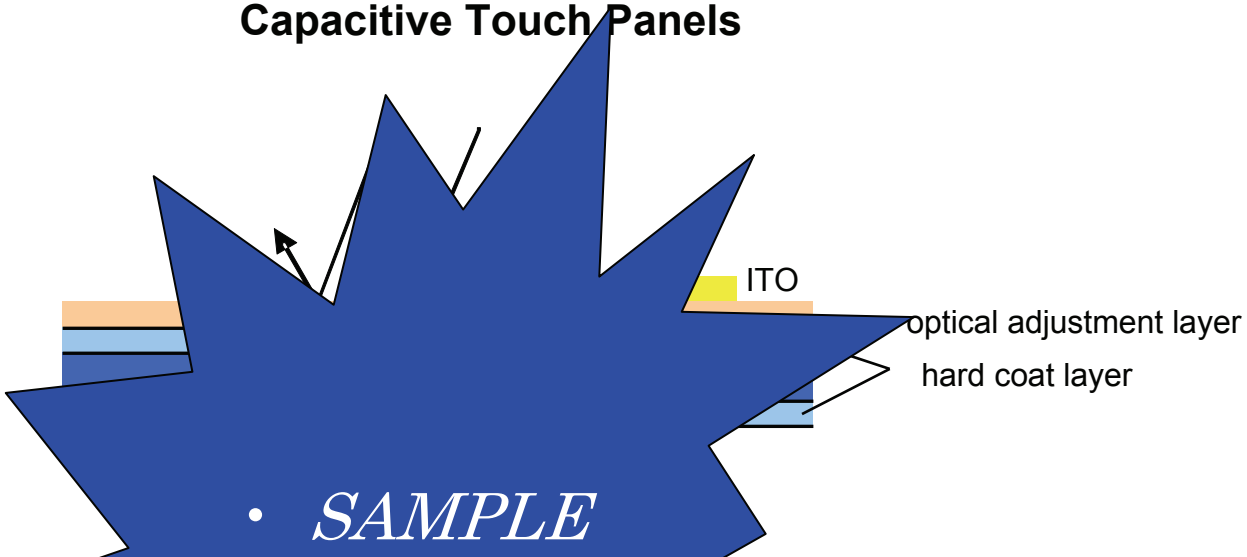
[Estimated by Yano Research Institute]

* Toray Advanced Materials Korea, Inc. was renamed from Toray Saehan Inc. in April 2010.

KIMOTO Leads With the Utmost High Share; TEIJIN and Oike Manufacture within Group



Need for Hard Coat Film That Makes the ITO Pattern Less Visible in Capacitive Touch Panels



- In a capacitive s causes the ITO to become more visible due to the een the ITO and the hard coat layers. To resolve th turers form an optical adjustment layer on th e refractive index on the surface of the base film so that it n bel applying the ITO sputtering procedure.
- However, it is not eas m less visible without affecting the transparency level. Other NI O DENKO, only limited manufacturers including Oike & Co. and Sekisui Nano C Technology are capable of supplying ITO films for capacitive touch panels.
- Although performing the optical adjustment based on dry coating is said to achieve a higher effect, using wet coating instead enables the manufacturer to reduce costs.

	For Resistive Touch Panels	For Capacitive Touch Panels
Thickness	125 μm, 188 μm	ly 125 μm ible thinning to 75 μm and 50 μm
Type	AG: Car navigat systems personal navigat vice Clear: Mobile ph	ly C r
Hard coat layer	Mainly both sid	adjustment layer
Examples of desired functions	ANR (Anti reflection, an	cking), optical adjustment ection

- With the expansion of the hard c ch p manufacturers with new strategies are entering the market. TION, which had been focusing on antireflective films and conductiv hed ard coat film with an optical adjustment layer formed by we lms is expected to be taking a similar approach.
- ITO films come in varying designs depe g on he sputter manufacturer, and it is not easy for hard coat film manufacturers to adjust the di ence in refractive index for each design. Oike Fine Coating, Inc. is actively coping with the challeng given that ITO sputtering is done within the Oike Group, and Higashiyama Film Co. Ltd. which has built close relationships with ITO sputter manufacturers, has been successful, reportedly. With the exception of these two firms, manufacturers in general have either only recently entered the market or are in process of research and development.

3-1. Ratio of Optical Applications in Sales Volume of PET Films

Ratio of Optical Applications in Sales Volume of PET Films
(Leading Four Domestic Suppliers)

(Unit: share on lower line)

	2009	2010	Yr/yr	2011 (estimate)	Yr/yr	2012 (forecast)	Yr/yr
FPD optical applications	84,600 (40.6%)	103,800 (40.8%)	122.7%	00		18,100 42.3%)	113.7%
Non-optical applications	123,600 (59.4%)	00	122.1%			61,400 57	8.5%
Total industrial applications	208,200 (100.0%)						110.5%

* Leading four domestic suppliers
TOYOBO. Figures inclu

Ratio of Optical Applications in Sales Volume of PET Films
(Leading Three Korea Suppliers)

(Unit: ton; share on lower line)

	2009	2010	Yr/yr	011 (estimate)	Yr/yr	2012 (forecast)	Yr/yr
FPD optical applicat	60,900 (30.3%)	0		1,500 9.4%)	123 %	169,500 (51.5%)	119.8%
Non-opti applicatio	140,100 69.7%			45,00	9.3%	159,500 (48.5%)	110.0%
Total indu					109.8%	329,000	114.8%

* Leadi

ano Research Institute]

Ratio o PET Films

FPD optica applications					15.7		
Non-optical applications	(			53,80 7.6%)			
Total industrial applications				4,400 0.0%)			127.4%

* Two Taiwan ogy. Figures include ex

[Est ed by Yano Research Institute]

nit: ton; share on lower line)

				nate)	r/yr	2012 (forecast)	Yr/yr
FPD optical applications					7%	200,100 (47.3%)	123.1%
Non-optical applications				8,100 4.9%)		223,300 (52.7%)	112.7%
Total industrial applications				176.	0,600 .0%)	423,400 (100.0%)	117.4%

n Industries, and Toray Advanced Materials Korea plus
g Materials Technology. Figures include exports by each

[Estimated by Yano Research Institute]

supp

●Foreign manufac s began to secure a fair amount of shares on the opti se PET film market in 2005.
●Leading Korean Taiwanese LCD panel manufacturers used to procure films as components and materials of LCD panels primarily from Jap n.
●It was around 2005 that Korea, the home of the world's two largest panel manufacturers Samsung and LG, began to promote the "Buy Korean" trend, almost as a state policy, of purchasing Korean-made components and materials. Furthermore, in Taiwan where companies until recently depended on Japan for optical components and materials, leading panel manufacturers such as AUO, CIC, CPT and Hannstar Display have been increasingly active in procuring domestic components and materials.
●Foreign panel manufacturers have requested PET film manufacturers in their respective countries to develop optical-grade materials. Since around 2008, foreign PET film manufacturers began full-fledged development and provision of optical-grade products to replace imports from Japan.

3-2. Sales Volumes of Leading Manufacturers of PET Films for Optical Applications

(Unit: ton; share on lower line)

		2009	2010	Yr/yr	2011 (estimate)	Yr/yr	2012 (forecast)	Yr/yr
Japanese Manufacturers	MITSUBISHI PLASTICS, Inc.	39,200 (26.1%)	53,300 (23.0%)	136.0%	56,3 (21.	105	59,100 (18.6%)	105.0%
	Toray Industries, Inc.	18,900 (12.6%)	21,100 (9.1%)	11.6%	21 (8		25,0 ( )	116.8%
	Teijin DuPont Films Japan Limited	16,100 (10.7%)	18,800 (8.1%)	1	1		00 %)	139.2%
	TOYOBO CO.,LTD	10,400 (6.9%)	10,600 (4.6%)	10				
	Sub-total	84,600 (56.4%)	10					113.2%
Korean Manufacturers	SKC	28,900 (19.3%)	37,0 (15.9%				0	110.6%
	Toray Advanced Materials Korea, Inc.	16,000 (10.7%)	37,000 (15.9%)					121.6%
	KOLON	16,000 (10.7%)	41				000 %)	129.3%
	Sub-total	60,900 (40.6%)	(49.					119.8%
Taiwanese Manufacturers	Nan Ya	4,400 (2.9%)	11,80 (5.1%)				21,0 (6.6%)	120.7%
	Shinkong Materials Technology Co., Ltd.	100 (0.1%)	1,5 (0			40.	9,600 (3.0%)	266.7%
	Sub-total	4,500 (3.0%)	(5.7%)		00 %)	157.9%	30,600 (9.6%)	145.7%
Total		150,000 (100.0%)	232,100 (100.0%)		,800 (100.0%)	115.0%	318,200 (100.0%)	119.3%

Note 1: Figures include exports by each supplier.
Note 2: Sum of PET films for optical applications and subsidiary materials (e.g. release films d protect films) for optical applications.

[Estimated by Yano Research Institute]

HIGH-PERFORMANCE FILM MARKET 2011

Price 200,000JPY (5% consumption tax (or 10,000JPY) added for shipment within Japan)

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