



# Part IV. Functional Polymers for Display Applications

## ■ Outline of Part

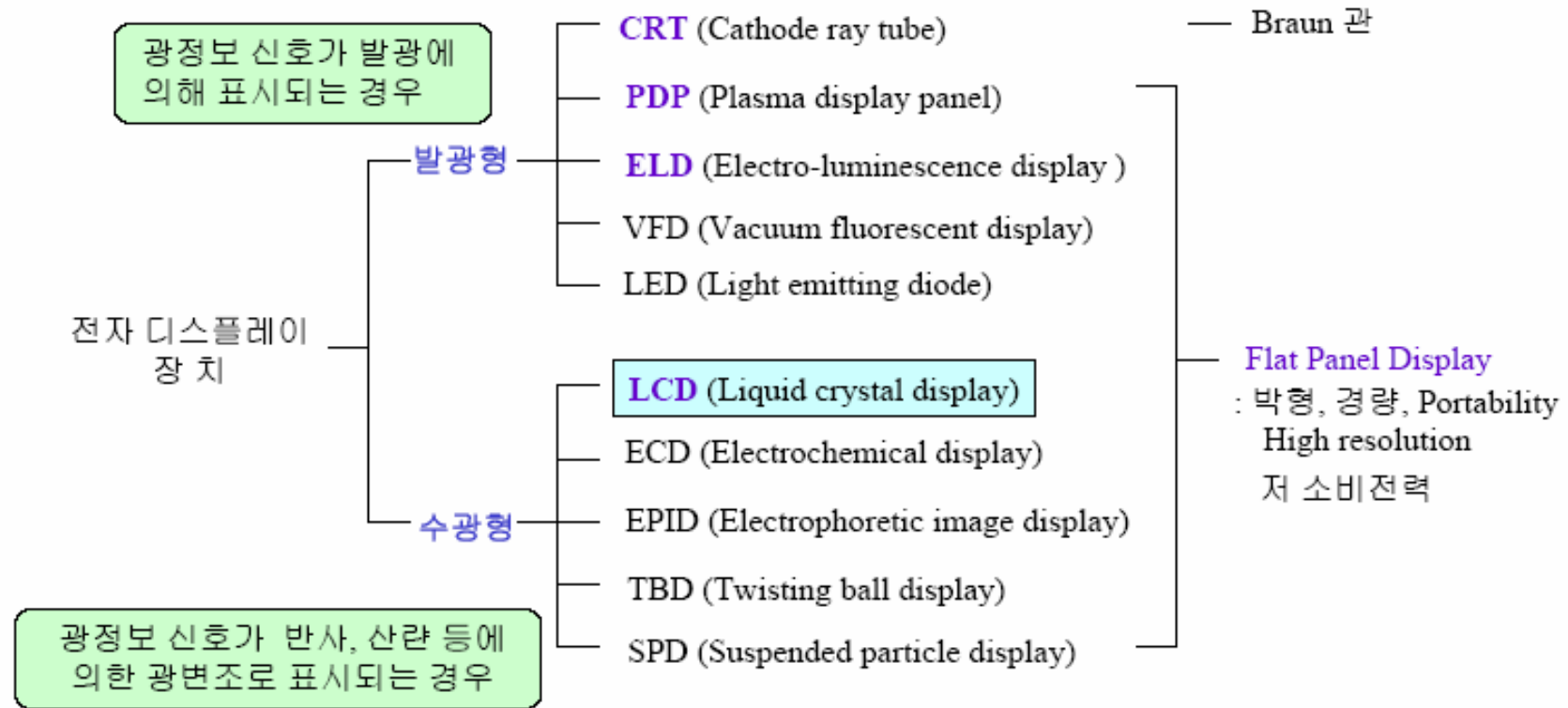
### Display Applications

- ❑ Introductions for Display Applications
- ❑ Liquid Crystal Display (LCD)
- ❑ Electroluminescence (EL)

# Flat Panel Display

- \* 정보산업 발전에 따라 멀티미디어용 고성능 평판 표시 소자 (**Flat Panel Display**)의 중요성 증대.
- \* **Display**의 종류
  - Cathode-Ray Tube (CRT)
  - Liquid Crystal Display (LCD)
  - Plasma Display Panel (PDP)
  - Electro-Luminescence Display (ELD)

# 전자 디스플레이 장치의 종류



# 주요디스플레이의 원리



그림. 빛의 3원색 (RGB)

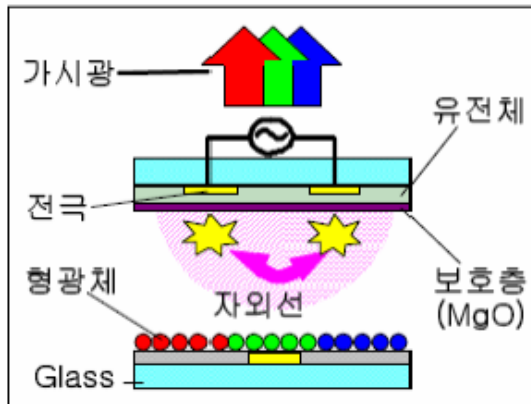


그림. PDP의 원리

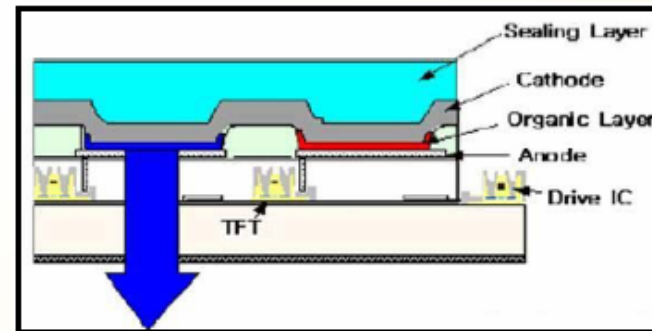
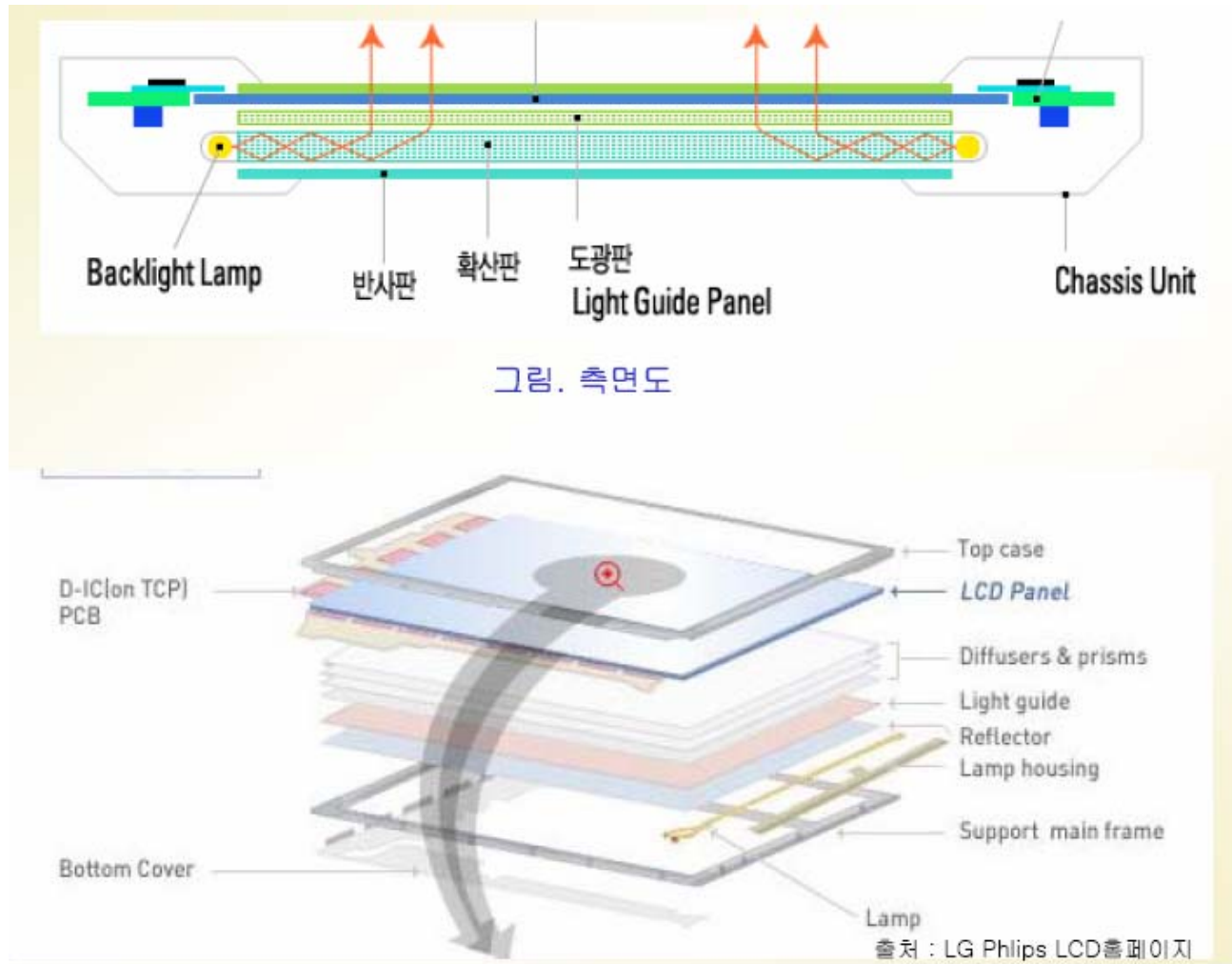


그림. OLED(유기EL)의 원리

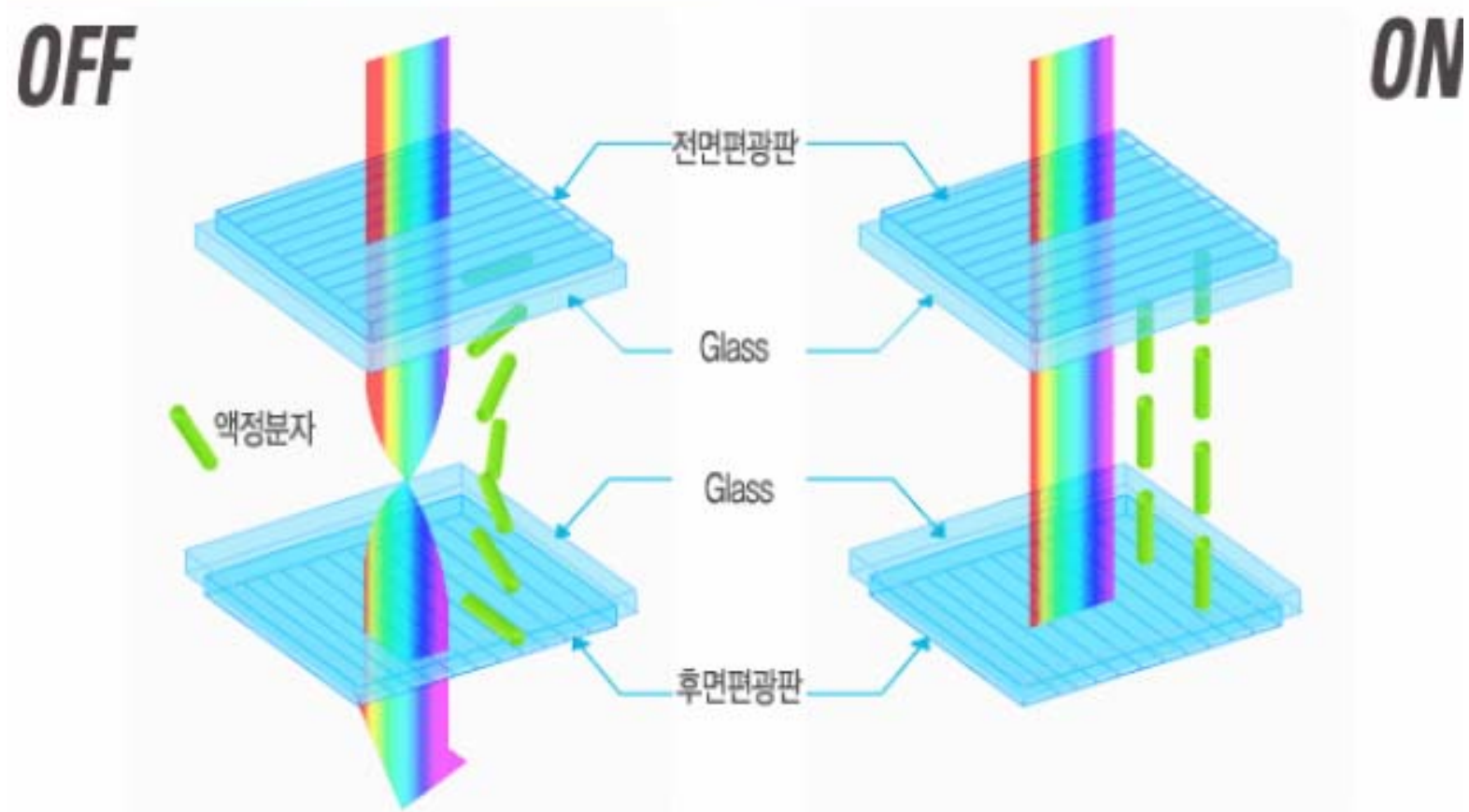
# Liquid Crystal Display (LCD)



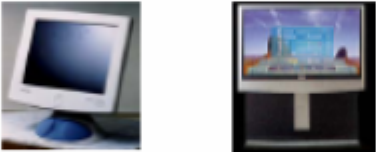

# LCD의 구조



# 동작원리



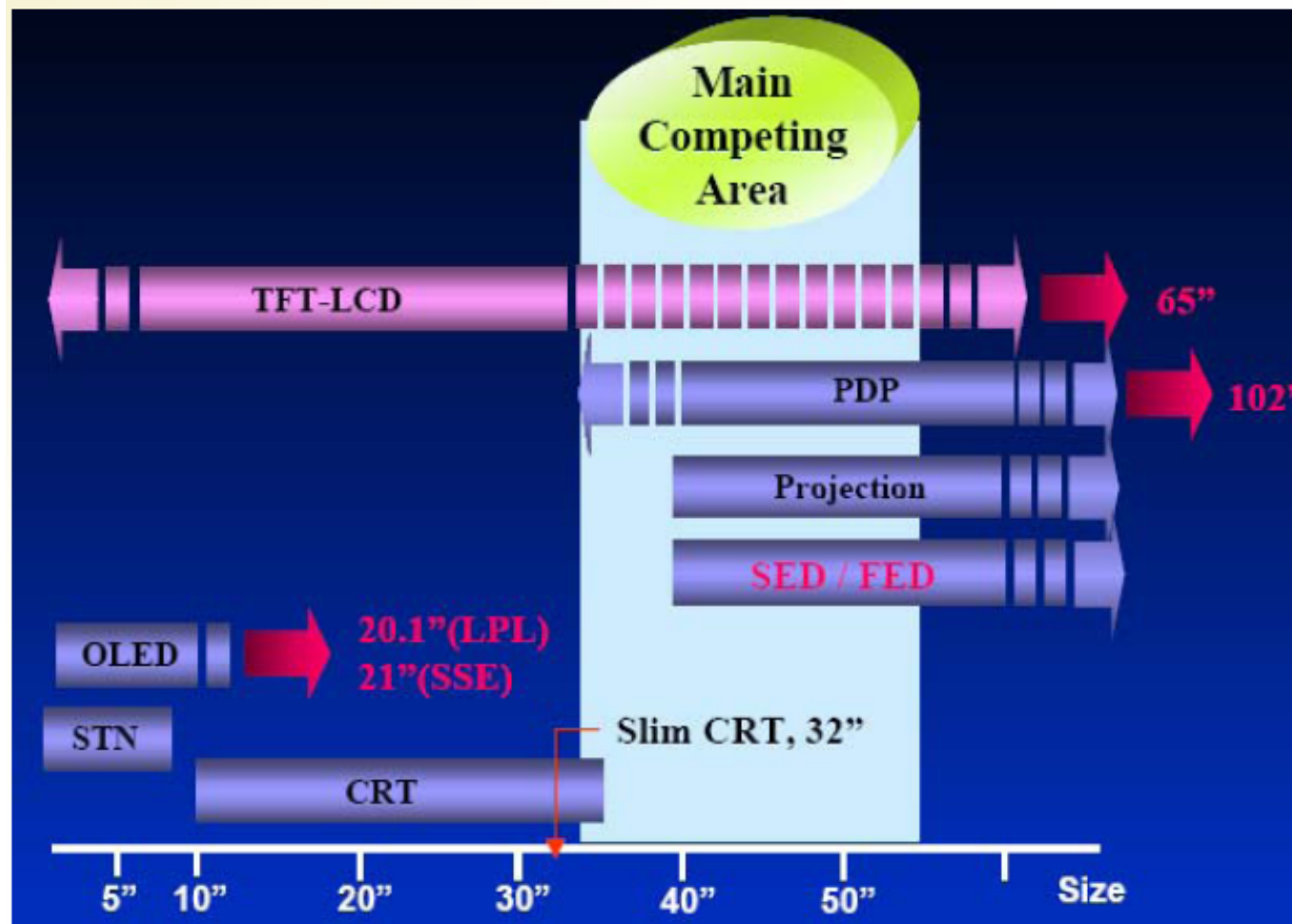
# LCD 응용분야

	Typical Application	Key Points	Light	Classification
노트북, 모니터		<b>Slim size,</b> <b>Power,</b> <b>weight</b>	CCFL	<b>Edge back light Guide</b> (Note PC, PC Monitor)
TV		Luminance Wide view	CCFL <b>Planar</b>	Area back light Guide (High End Monitor)
모바일 LCD		Power Luminance	LED, CCFL	<b>Edge back light Guide</b> Front light Guide (Mobile Display)

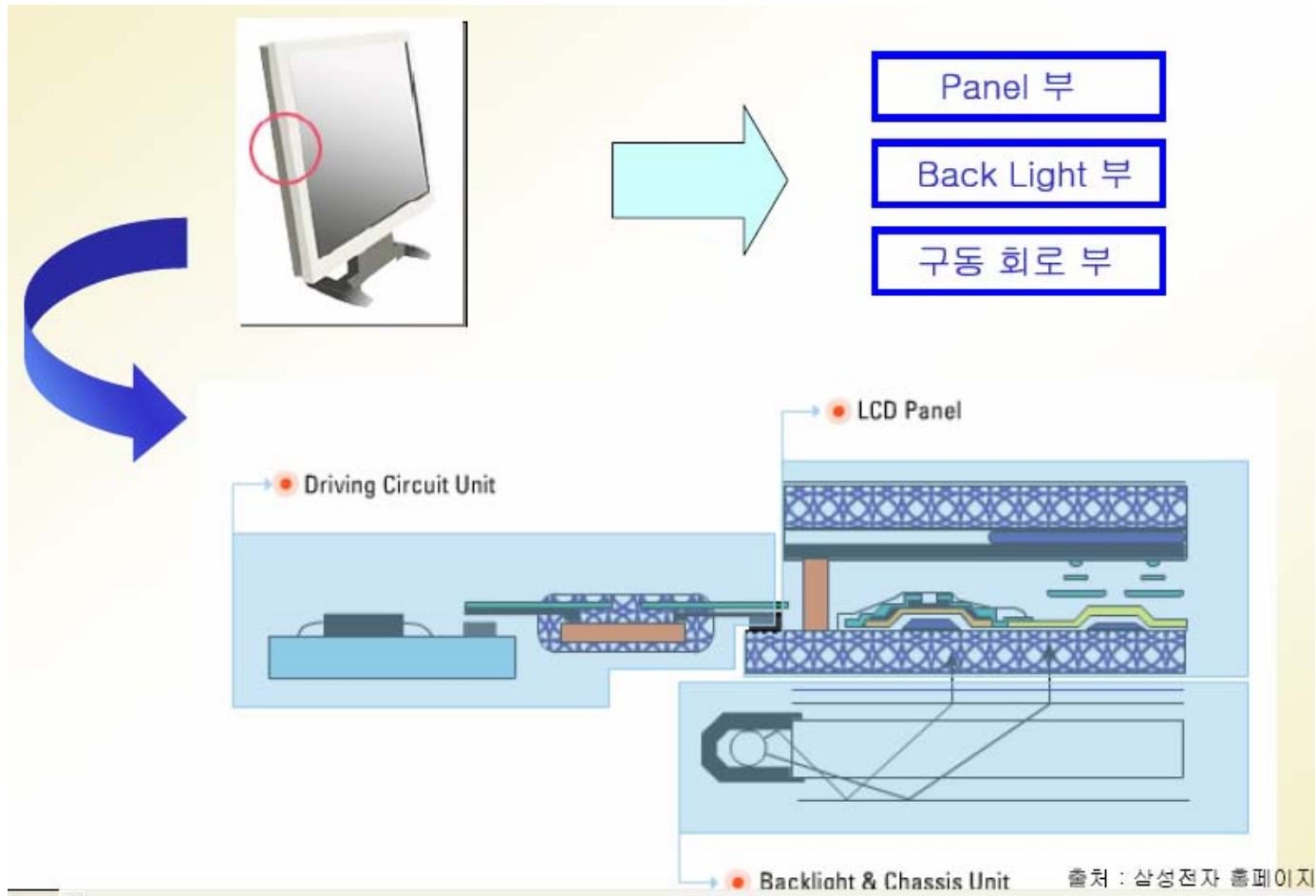
CCFL: Cold Cathode Fluorescent Lamp



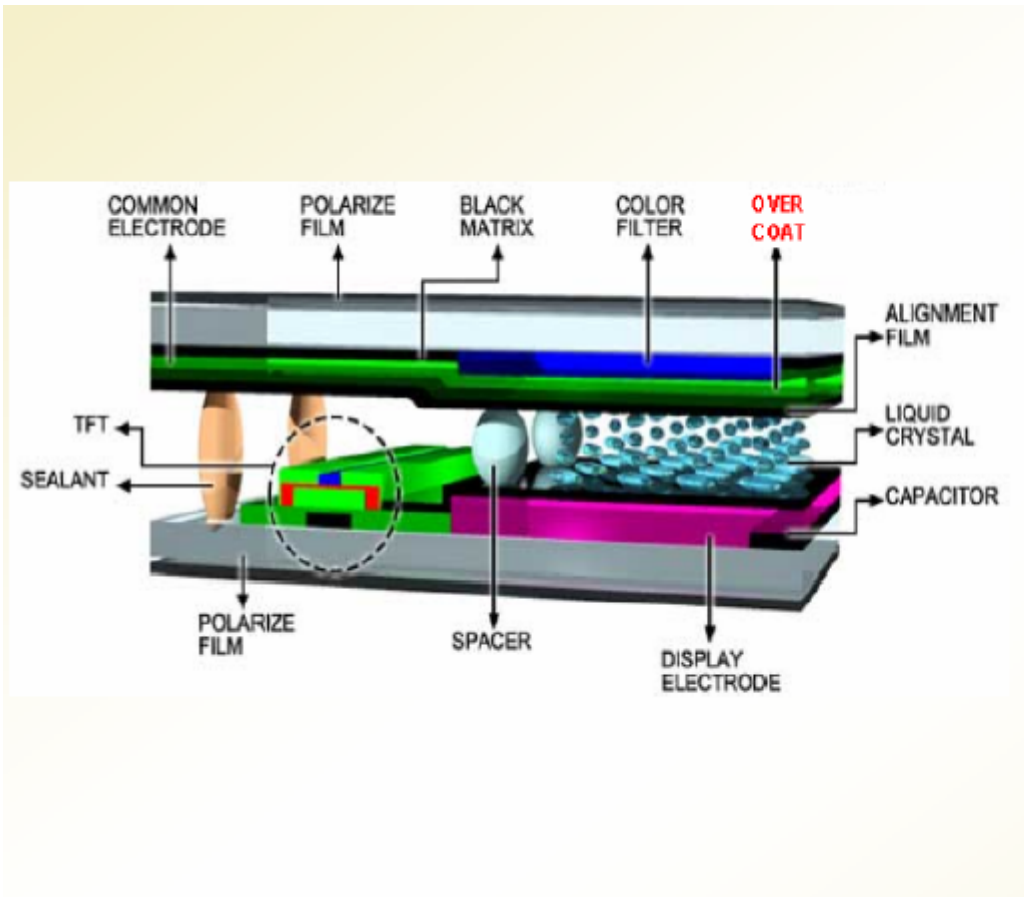
# LCD의 적용 범위



# LCD의 세부 부분

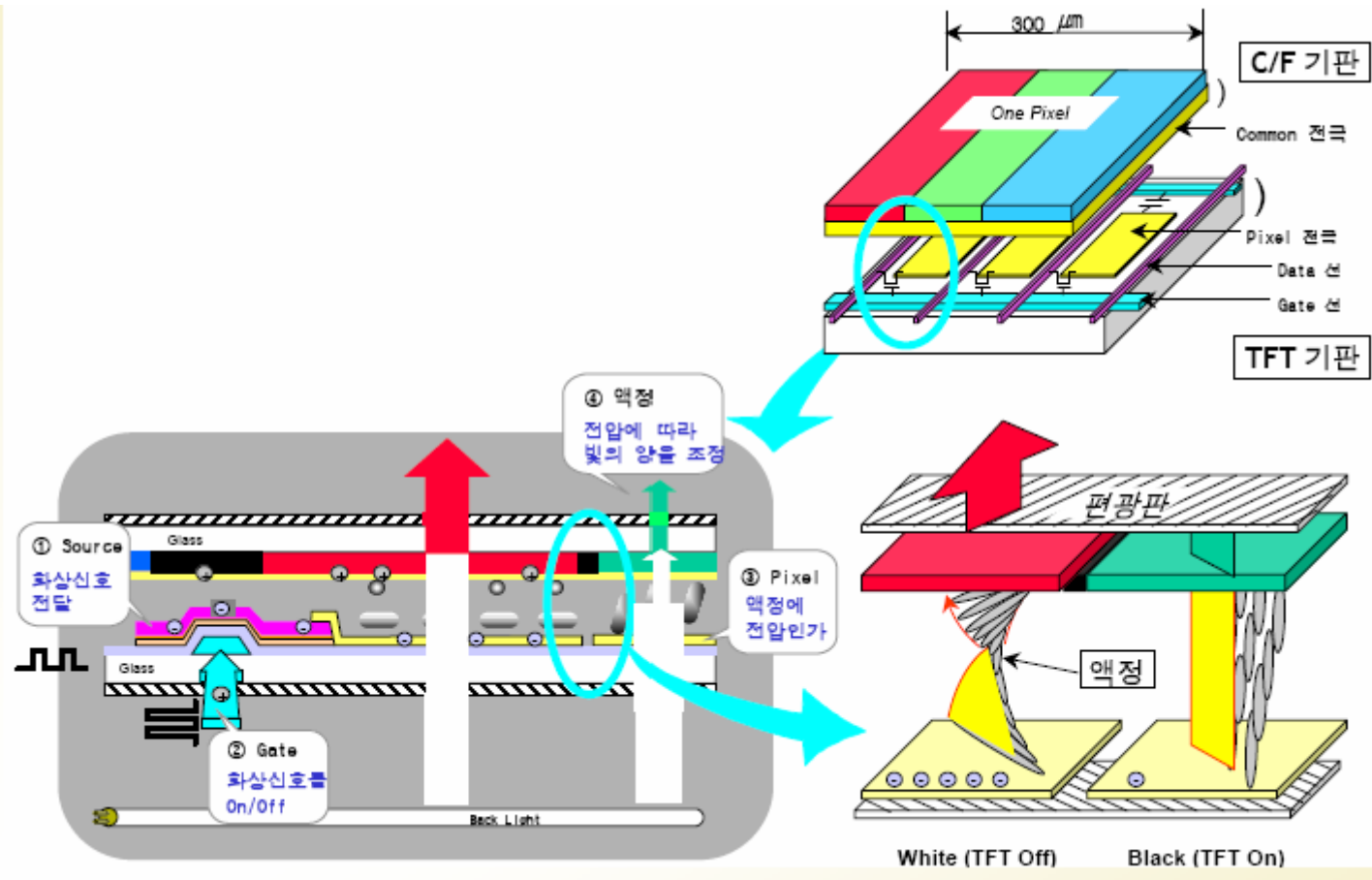


# Panel의 구조



소재	용도 및 역할
Black Matrix	빛의 누설 차단
Color PR	Color filter구성
Overcoat	Color filter 보호막
spacer	Cell의 간극 유지
액정	빛의 on/off
배향막	액정 배향
유기절연막	전류 누설 방지
편광필름	광투과제어

# TFT의 구조 및 동작원리



# BLU (Back Light Unit)

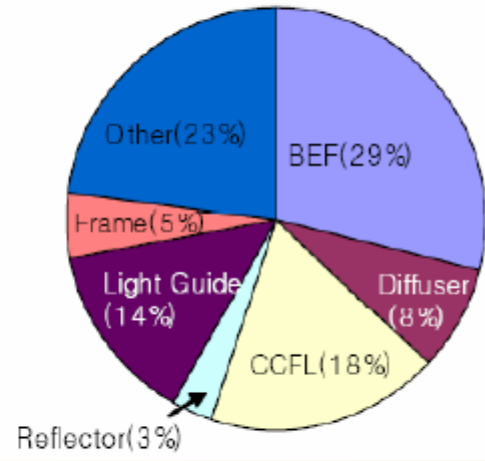
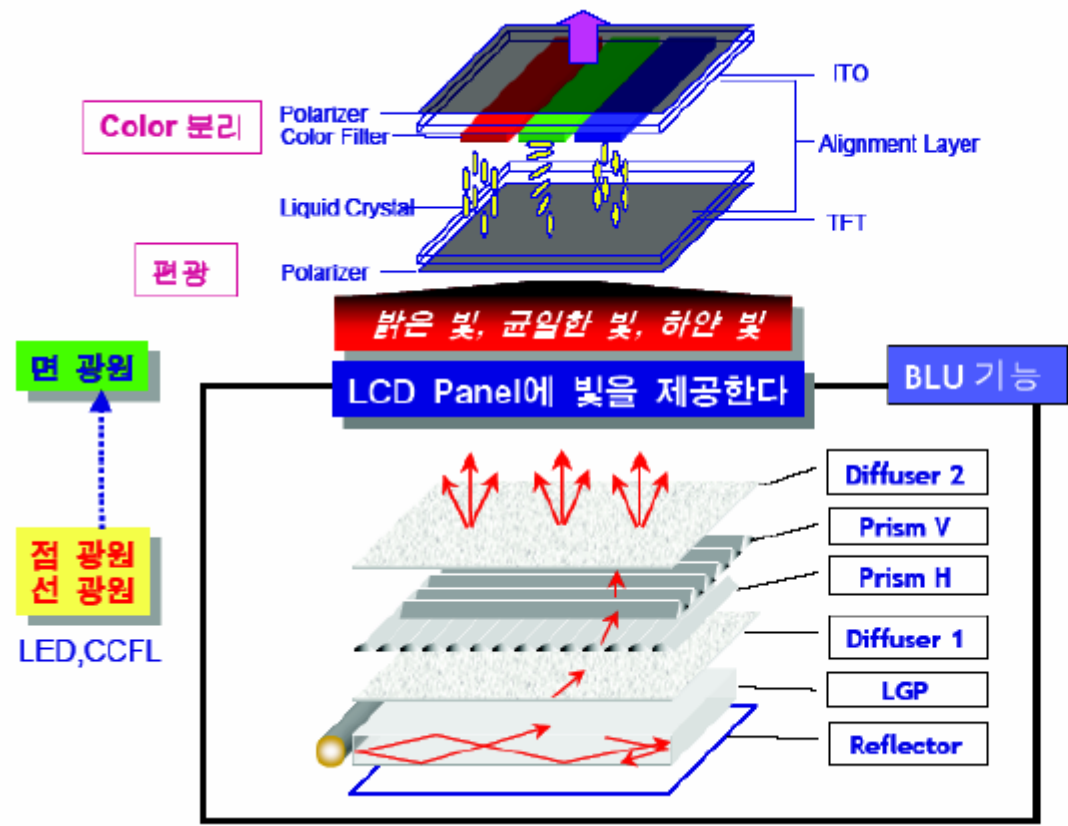
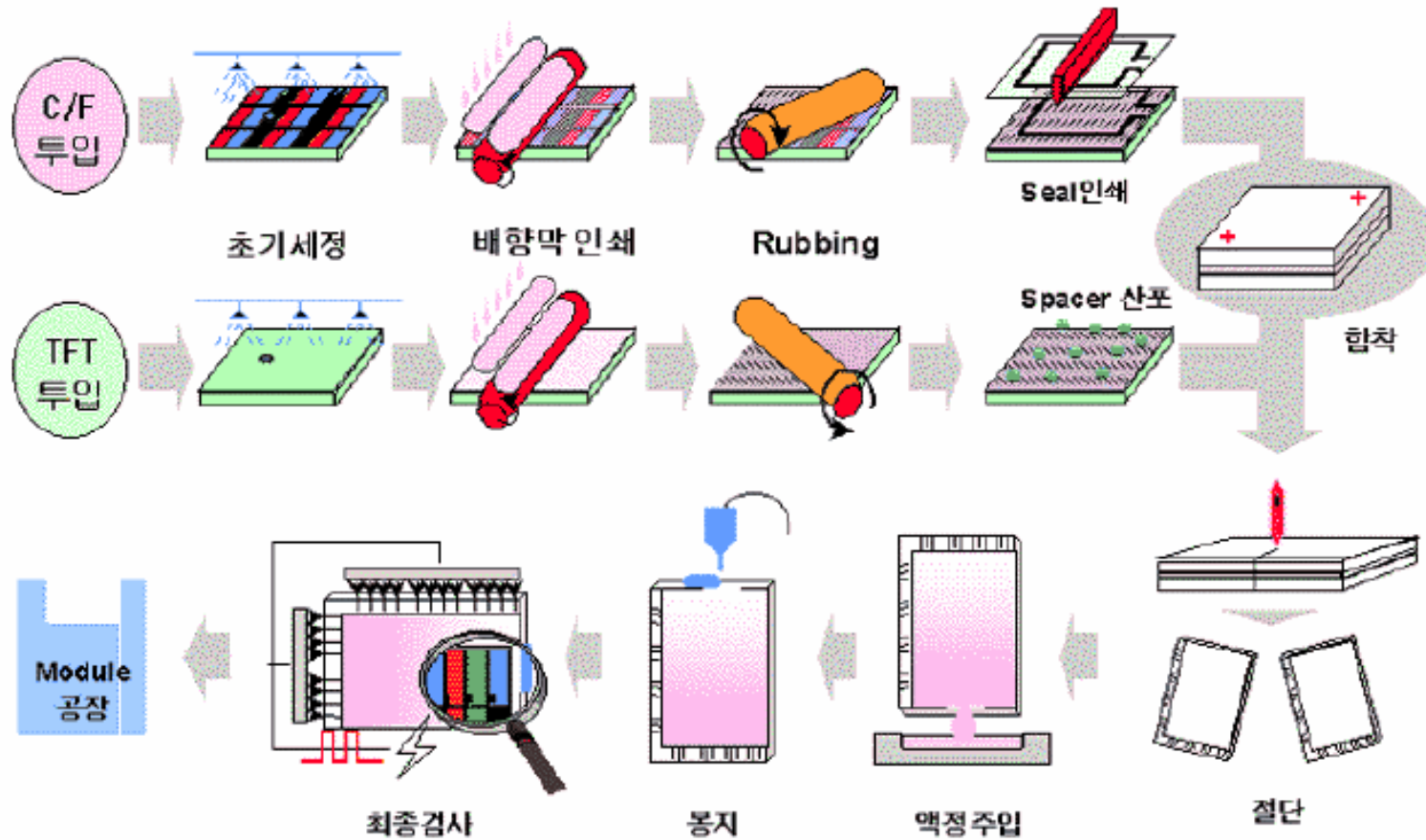
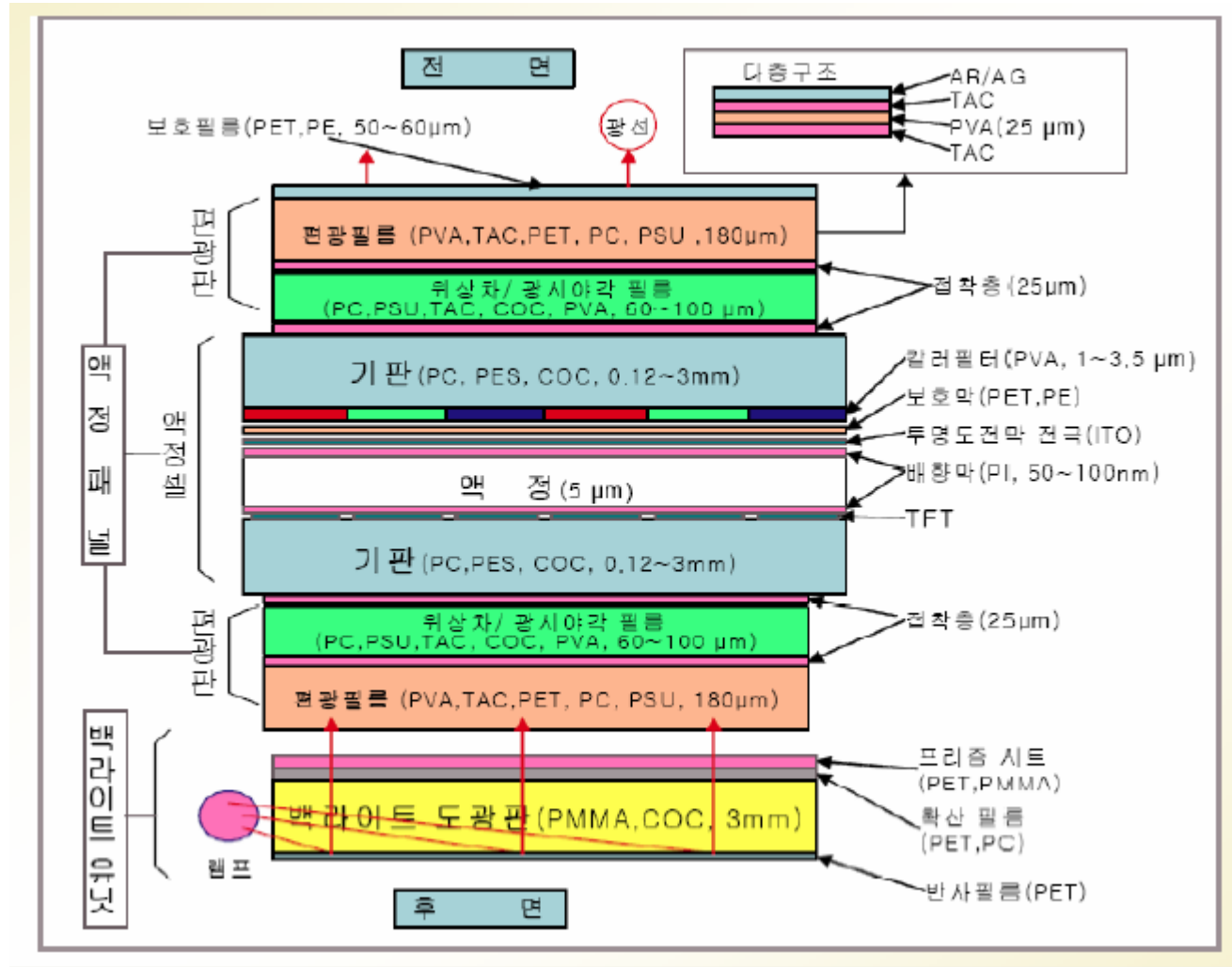


그림. BLU재료별 가격비

# Penel 제작공정

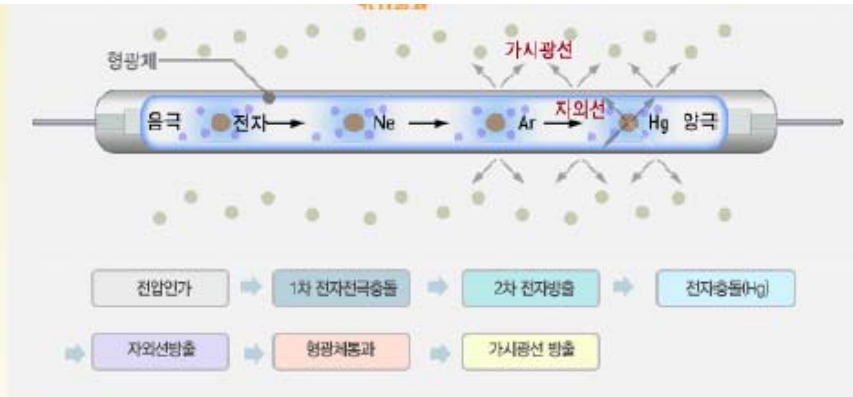


# LCD에 사용되는 고분자 재료



# LCD에 사용되는 고분자 재료

CCFL



도광판

Computer Monitor용



Notebook용



Car Navigation용

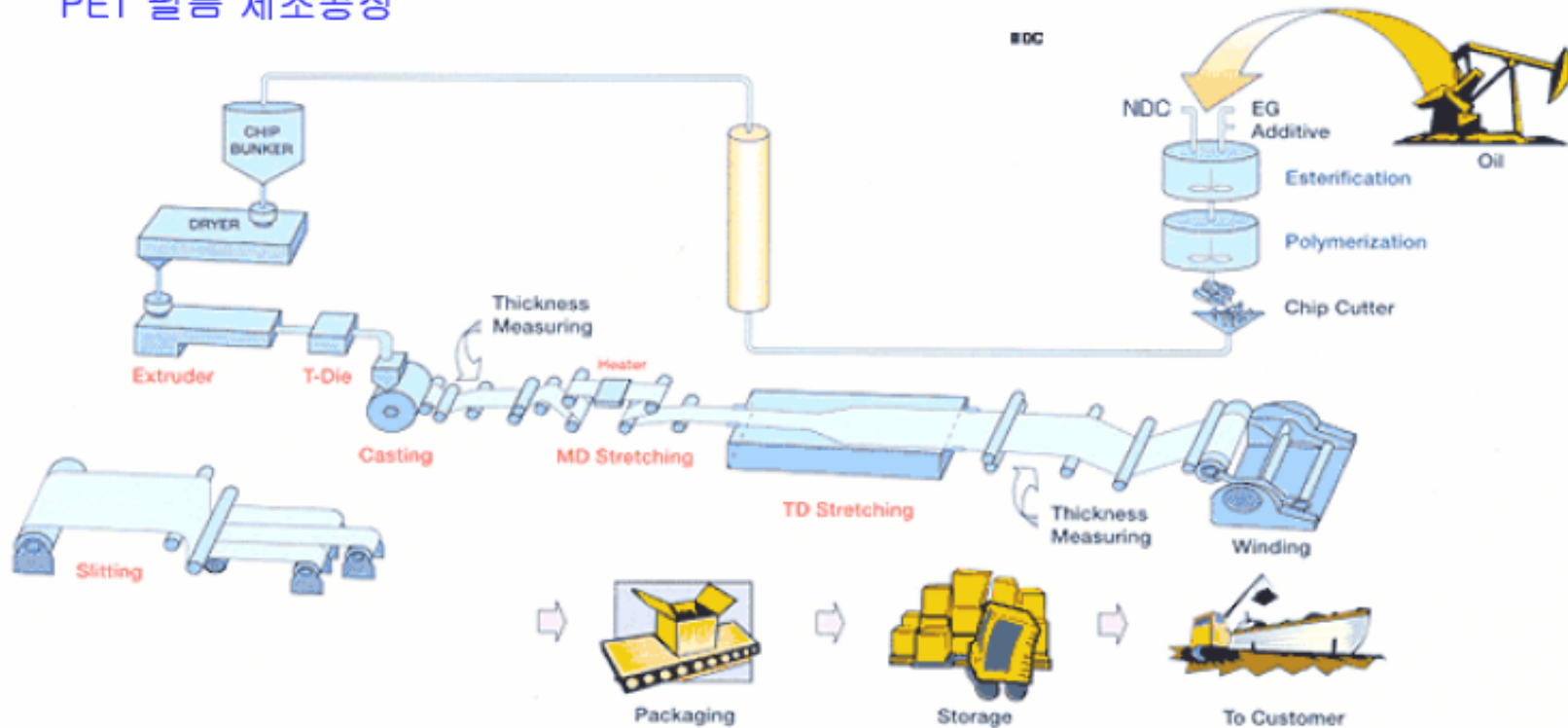


주요 재료 : PMMA, PC, COC



# 광학필름

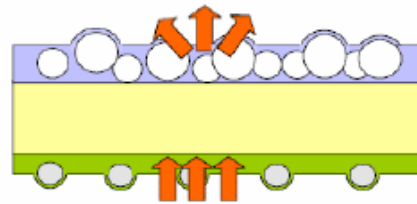
## PET 필름 제조공정



PET는 광학필름의 기본 기재로 사용되고 있음.

# 광학 필름

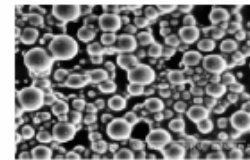
## 확산 필름



Diffusing Layer

Substrate: PET

Anti-blocking Layer

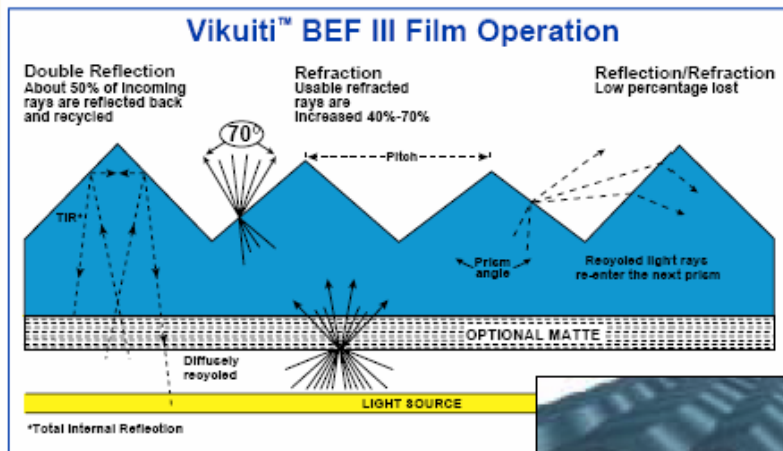


Surface



Cross-sectional  
PET Film

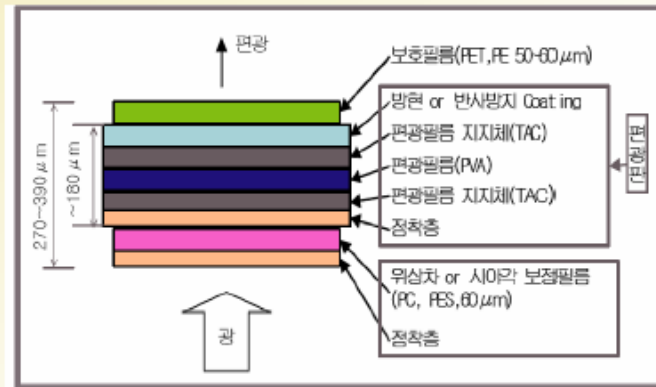
## 프리즘 필름



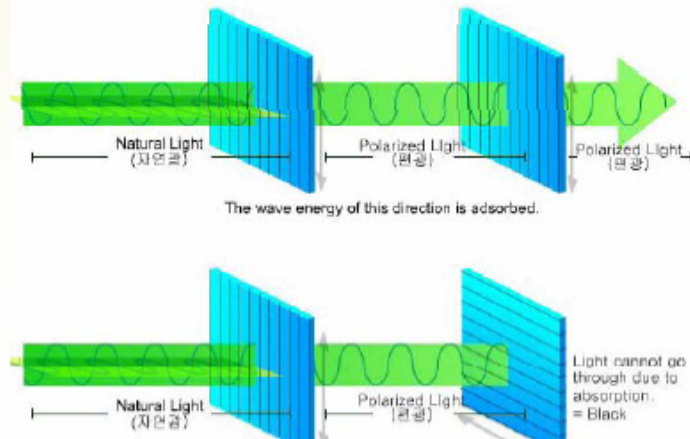
Random Prism Pattern  
(artist's renderina)

# 편광 필름

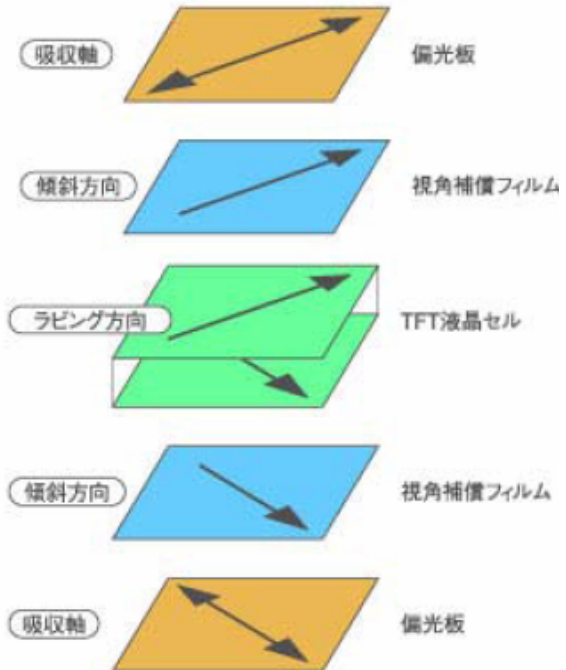
## 구조



## 원리

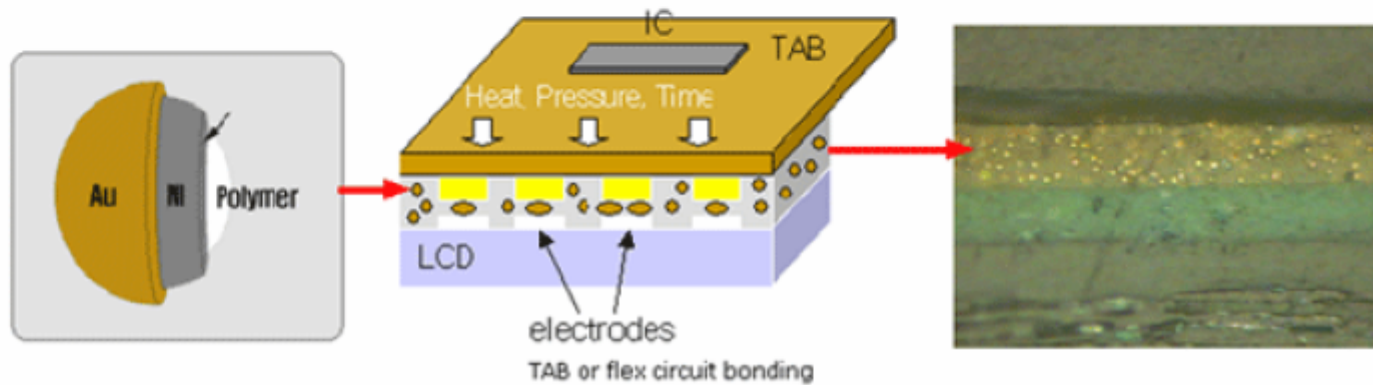
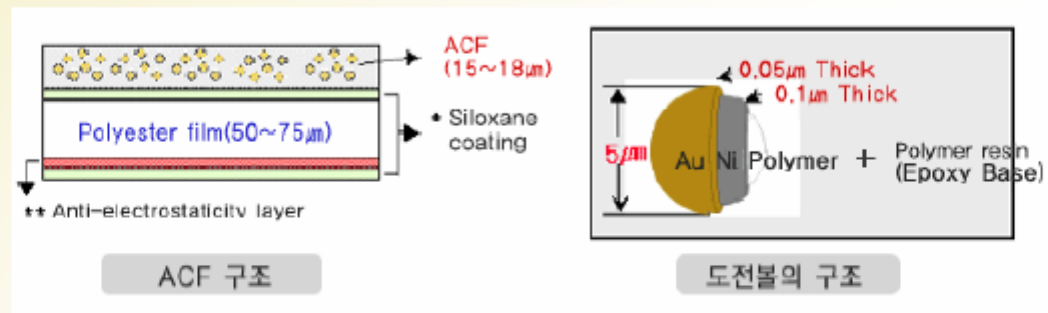


## 실장방법



# ACF

## ACF (Anisotropic conductive film)



# LCD에 사용되는 고분자 소재 정리

물성	단위	PET	PEN	PC	PAc	PES	TAC	COC	유리
비중	-	1.40	1.36	1.20	1.20	1.37	1.30	1.02	2.52
굴절율	-	1.66		1.59	1.60	1.65	1.49	1.53	1.54
투과율	%	88	82	90	87	88	94	92	93
열팽창 계수	ppm/ ℃	20	13	70	70	44		60	7
Tg	℃	69	121	155	255	223	92	80~185	660
흡수율	%			0.2	0.2	0.4	4.0	<0.01	0.2