

# AMOLED Manufacturing Process Report

Ver. 5



2023



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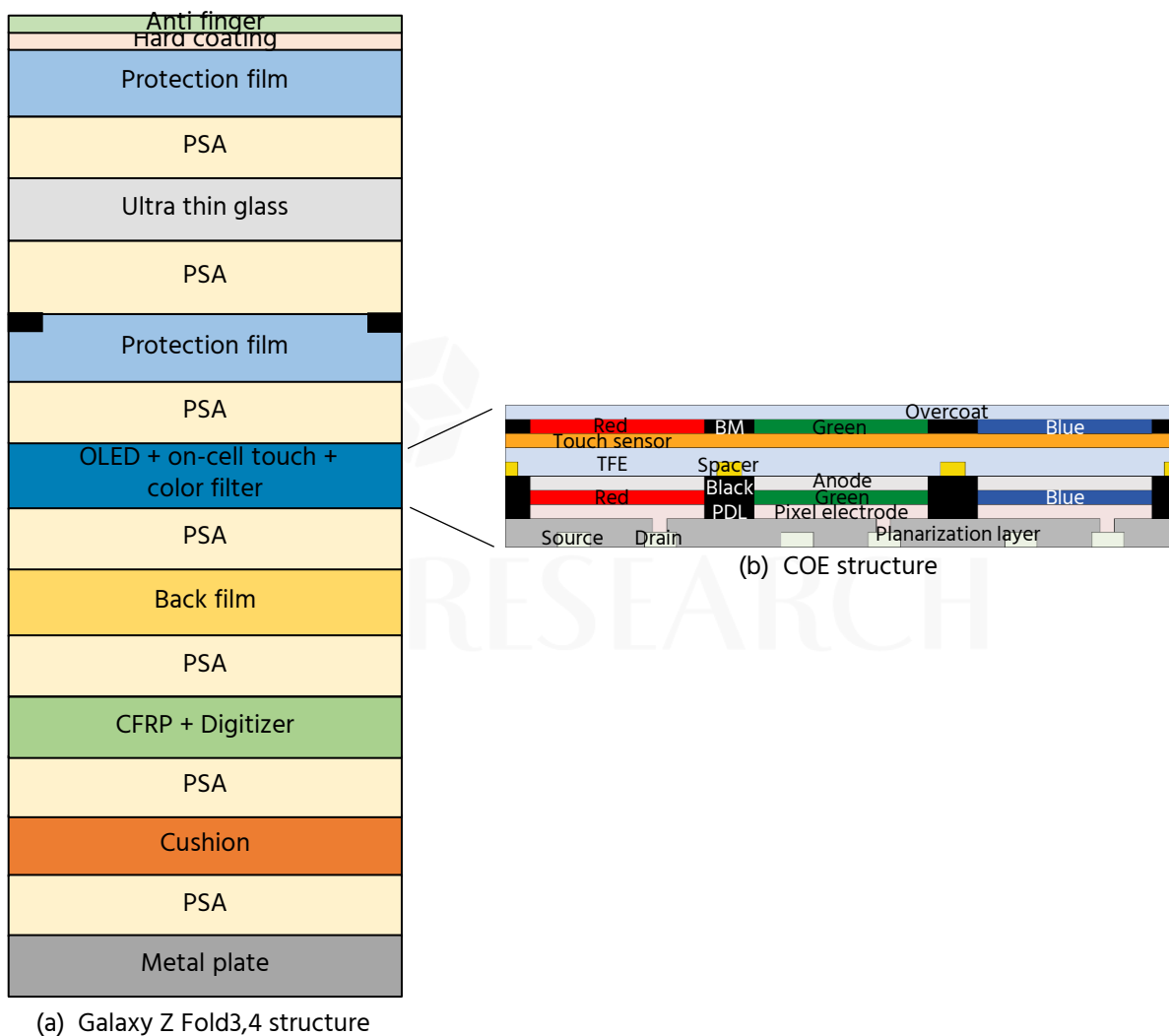
# 1. AMOLED Structure

## 1.2 Foldable OLED Structure

### Small Foldable OLED Panel\_Galaxy Z Fold3,4

- In 'Galaxy Z Fold 3' and 'Galaxy Z Fold 4', two digitizers are placed on the left and right for touch pen use, and carbon fiber reinforced plastic (CFRP) is used to protect the digitizer.
- Until 'Galaxy Z Fold2', a polarizer was used to prevent reflection, but from 'Galaxy Z Fold3', color filter on encapsulation (COE) technology is applied.
- UTG and PET were used for the cover window and back film, respectively.

Foldable OLED structure for 'Galaxy Z Fold3,4'

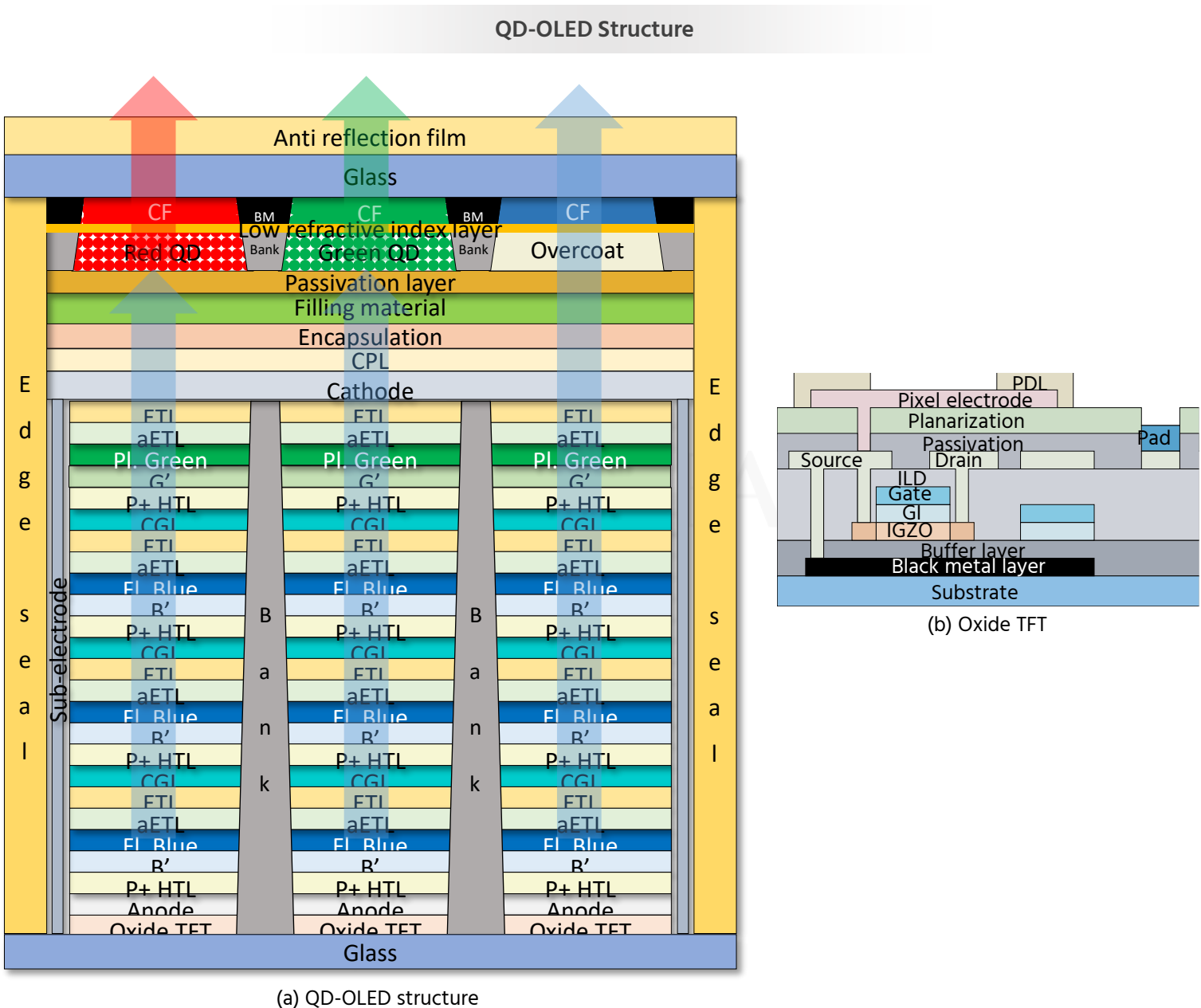


# 1. AMOLED Structure

## 1.3 Panel Structure for TV

### QD-OLED Panel

- Oxide TFT is used, and OLED pixel is a 4-stack structure with top emission structure.
- Light-emitting structure is based on QM2 standard applied from the end of 2022.
- A color filter is applied initially to prevent the emission of QD material caused by external incident light.
- A low refractive index layer is added between the color filter and QD to improve light extraction.
- There is no polarizer, and an anti-reflect film is applied to the upper substrate to prevent reflection of external light.



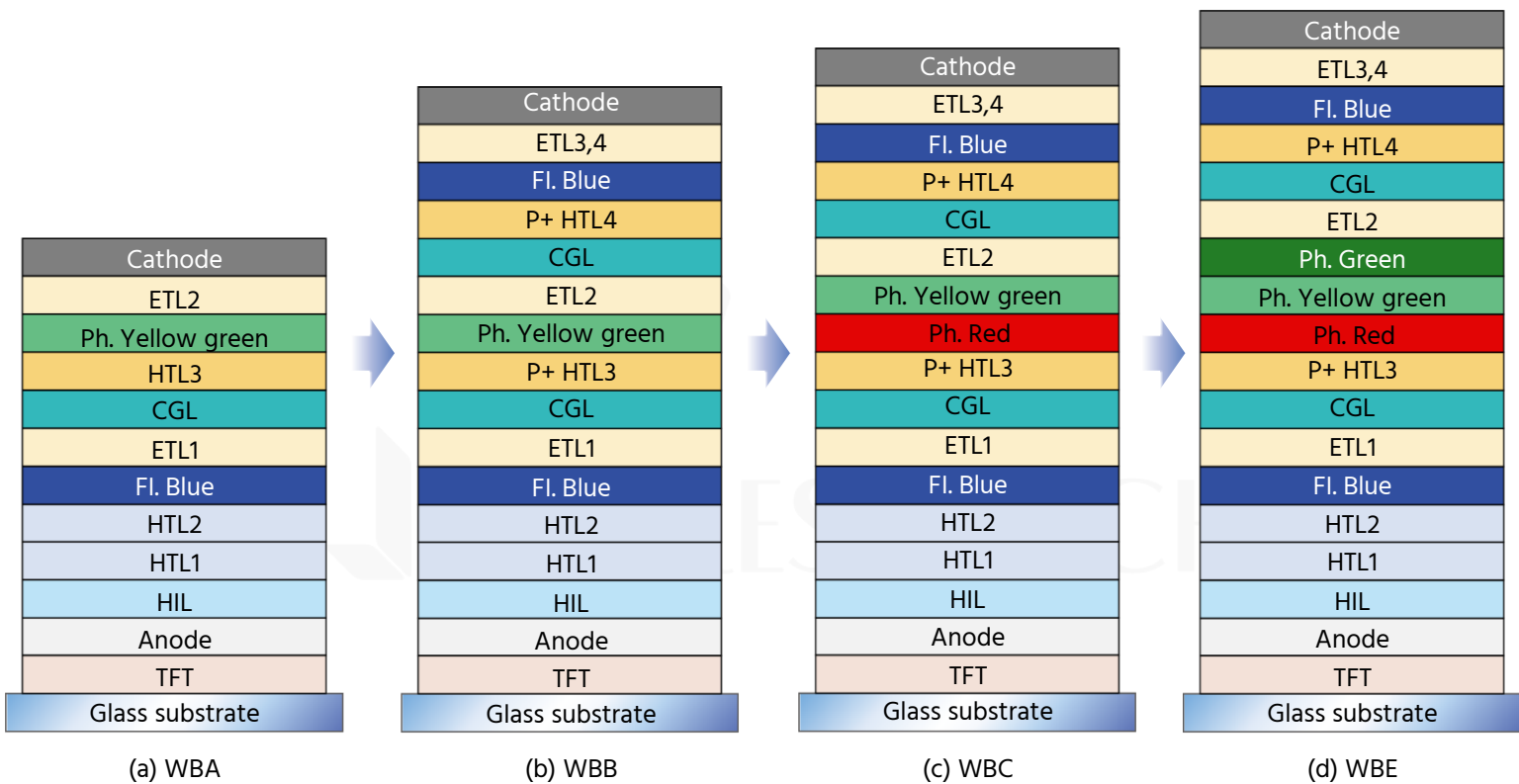
# 1. AMOLED Structure

## 1.7 OLED Pixel

### WRGB OLED Structure Change

- Until 2014, WRGB OLED was mass-produced as a 2-stack WBA structure in which fluorescence (fl.) blue and phosphorescence (ph.) yellow-green were stacked.
- In 2015, it was mass-produced in a 3-stack WBB structure with additional fl. blue added to improve lifetime.
- Ph. red was introduced to the WBC structure mass-produced from 2016 to 2022 to improve the color gamut.
- From the second half of 2020, Ph. green was added to the WBE structure applied to the Guangzhou line, and the existing blue material was changed to blue with deuterium substitution technology. Panels with WBE structure has been mass-produced at the Paju line since 2022.

### Structure change for WRGB OLED



## 2. TFT Manufacturing Process

### 2.7 SDC Oxide TFT Manufacturing Process

- Pixel electrode deposition

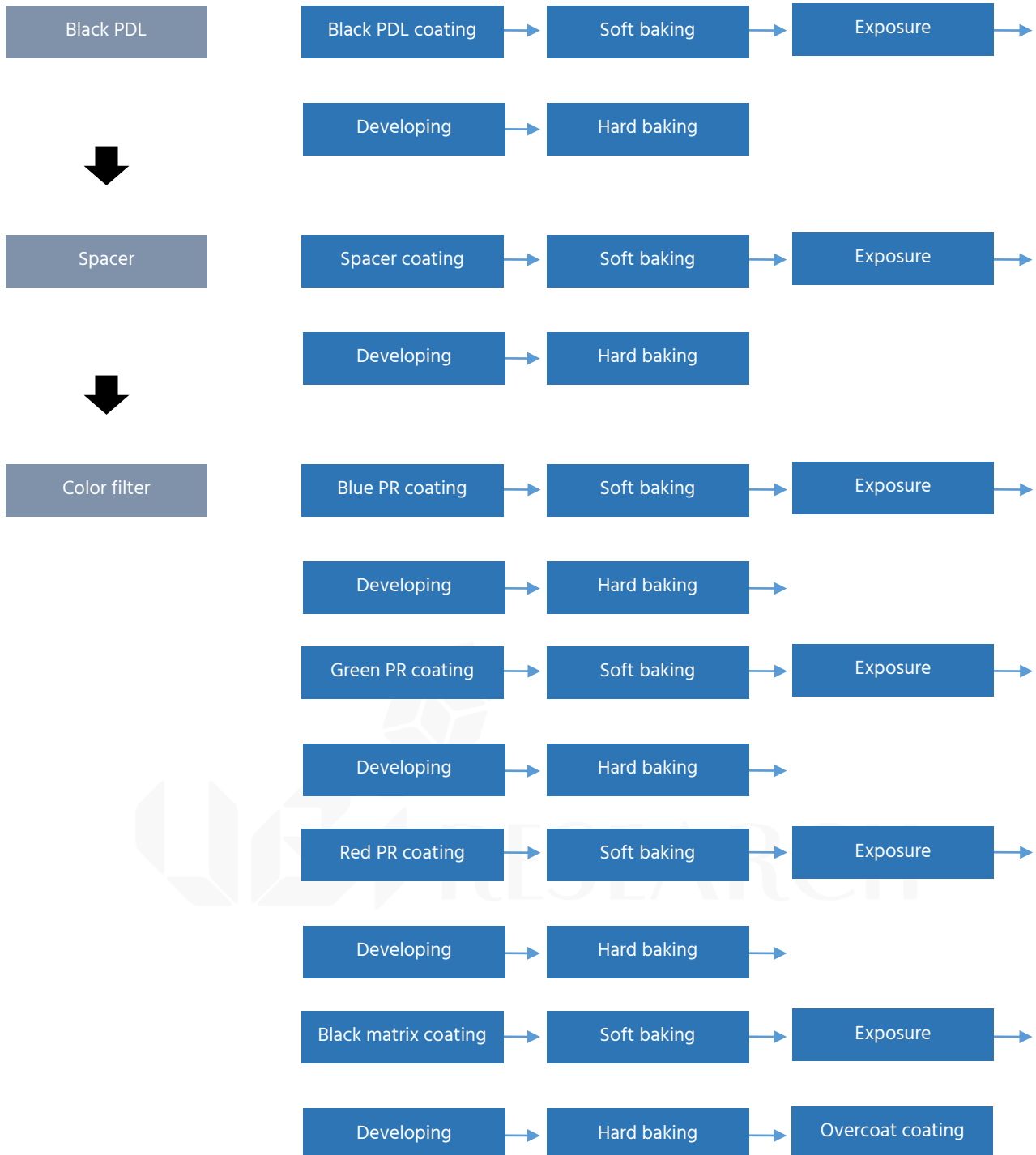
#### Oxide TFT manufacturing process and equipment

Process	Materials	Equipment
	EUV, DI water	Cleaner
	ITO/Ag/ITO	Sputtering
	EUV, DI water	Cleaner
	Positive PR : Siloxane or acrylate	Coater

# 4. Cell Manufacturing Process

## 4.4 Color Filter on Encapsulation Manufacturing Process for Mobile Device

### Color Filter on Encapsulation Manufacturing Process





# 5. Module Manufacturing Process

## 5.4 Foldable OLED Module Manufacturing Process

### Basic Structure

- Based on the 'Galaxy Z Fold4', Samsung Display is using 30 um ultra thin glass for the cover window.
- The polarizer used in Flexible OLED has been replaced with a color filter and black PDL.
- A digitizer and carbon fiber reinforced plastic (CFRP) are placed at the bottom of the panel to enable the use of a pen.

Foldable OLED structure for 'Galaxy Z Fold4'

