

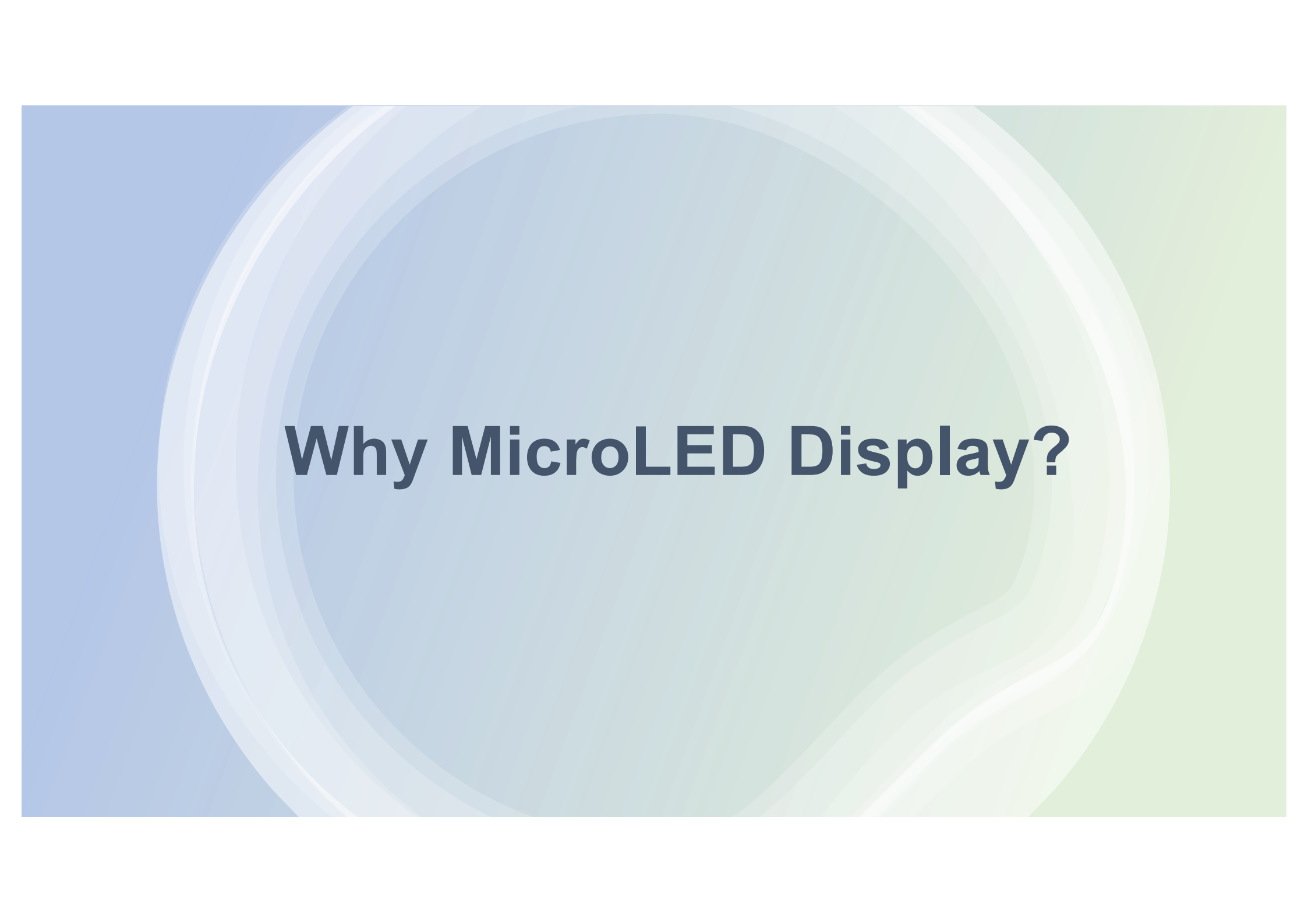
2025年 MicroLED 技術的量產與商業化：機會與挑戰的時代

PlayNitride Inc.

2024/12/05

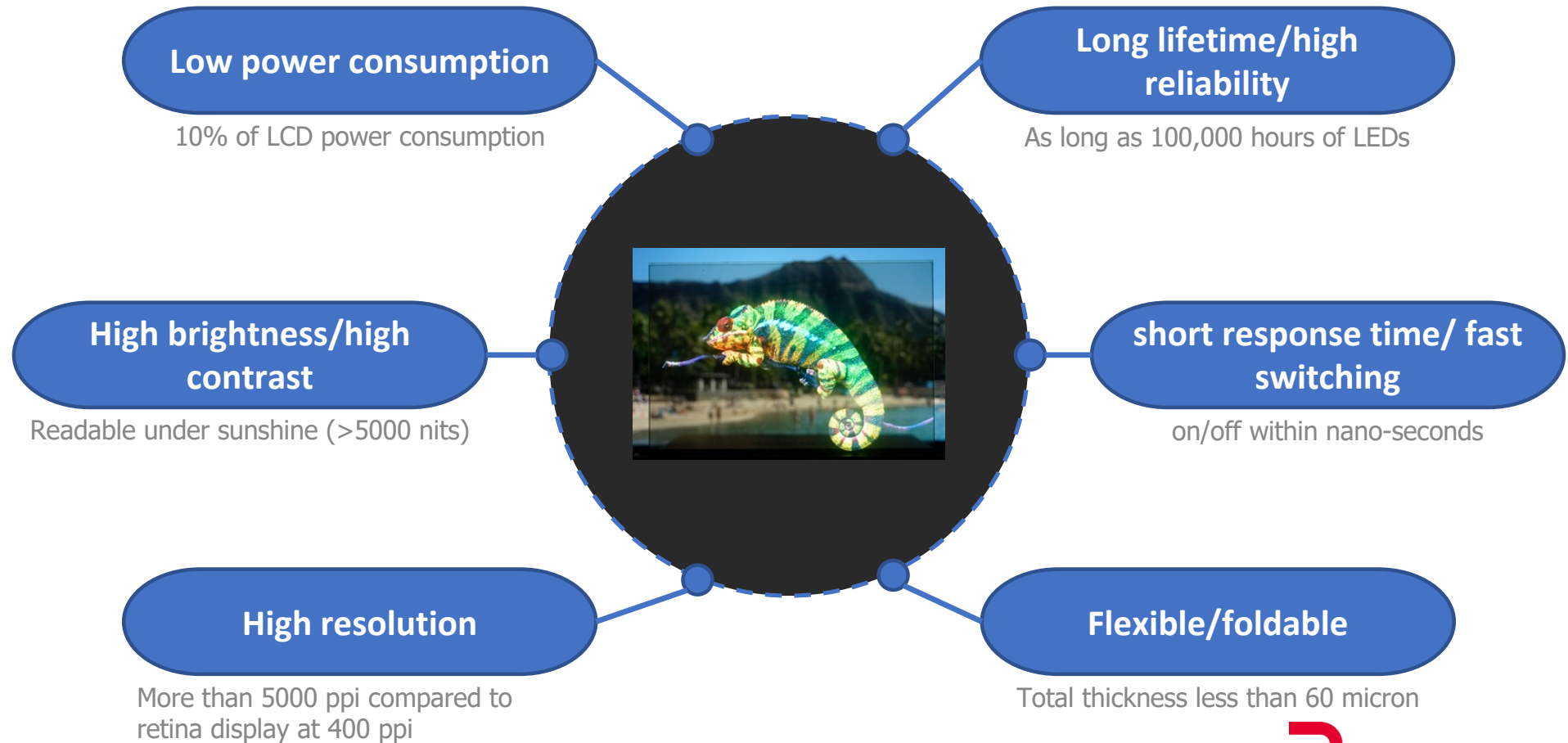
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Why MicroLED Display?

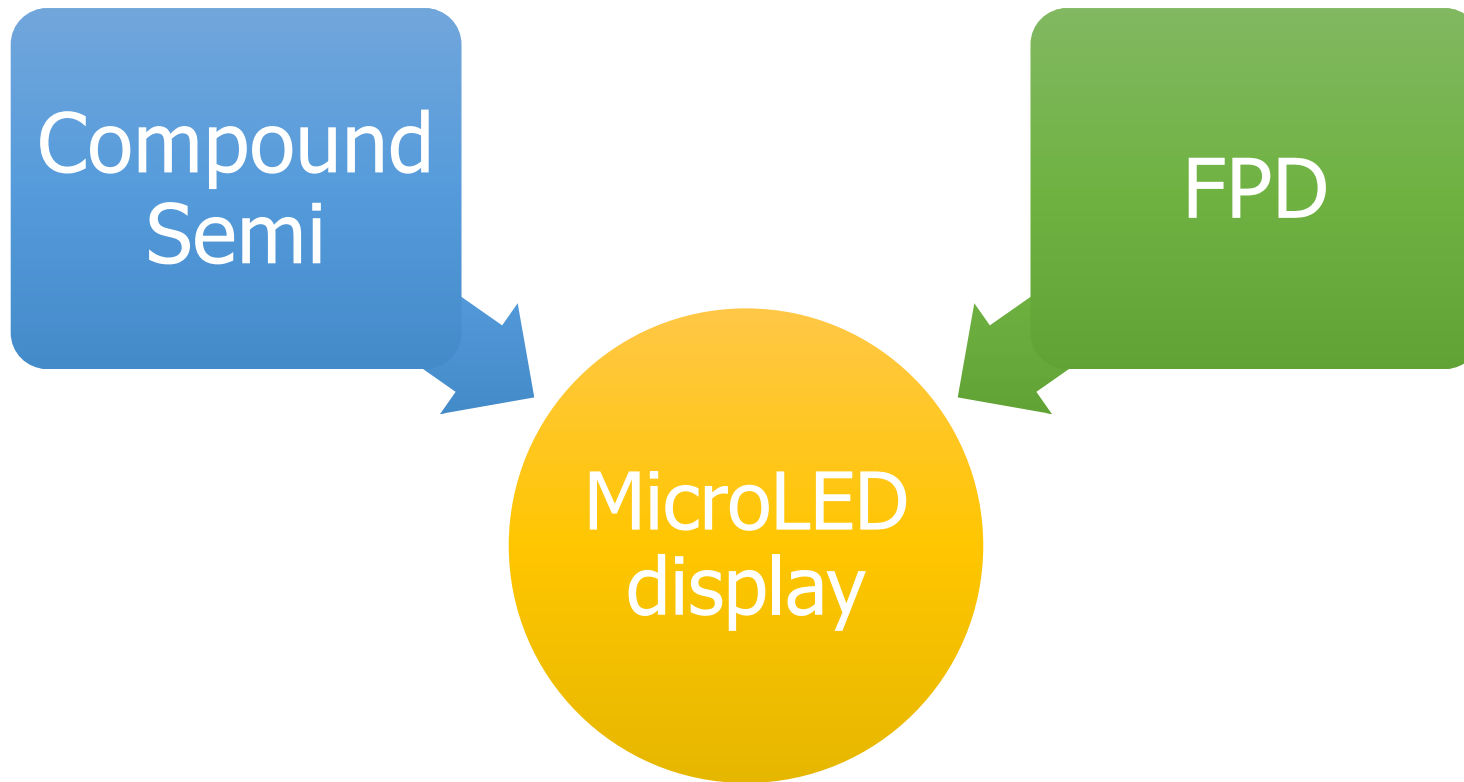
Advantages of MicroLED Display



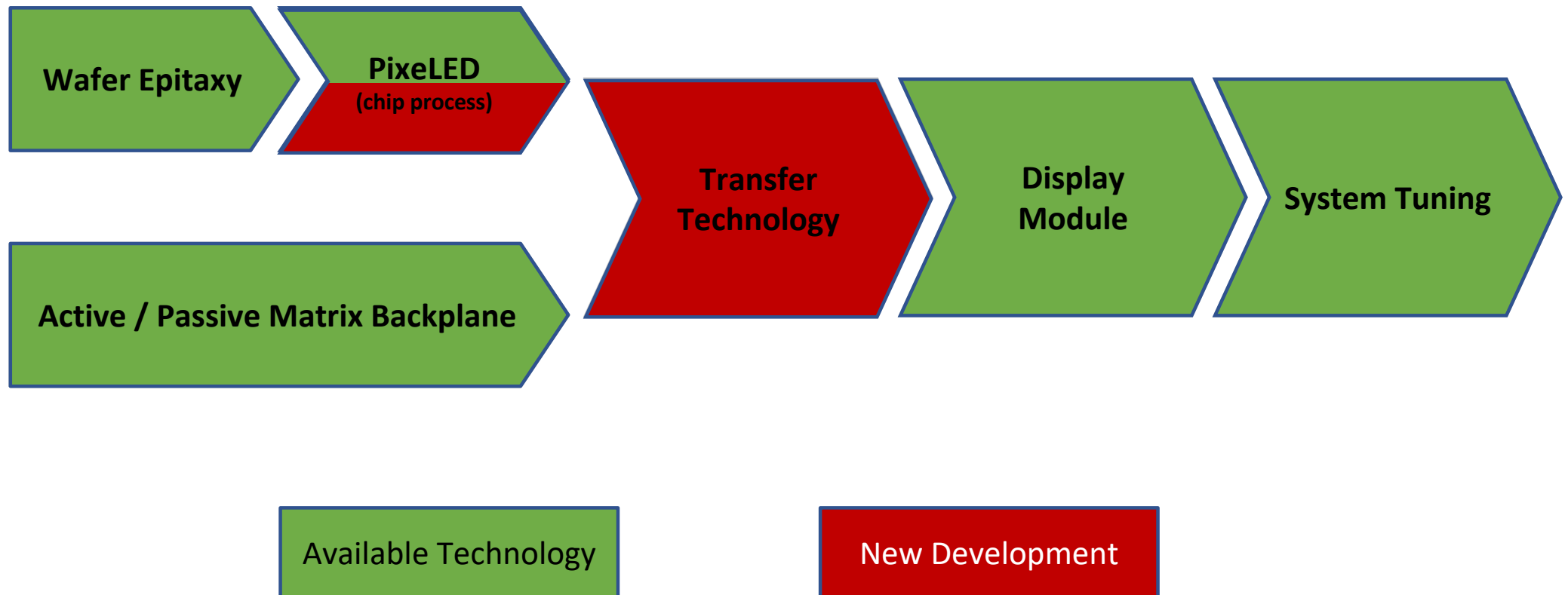
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How long will it take to develop
this technology? (very long?)



MicroLED display technology is not from zero

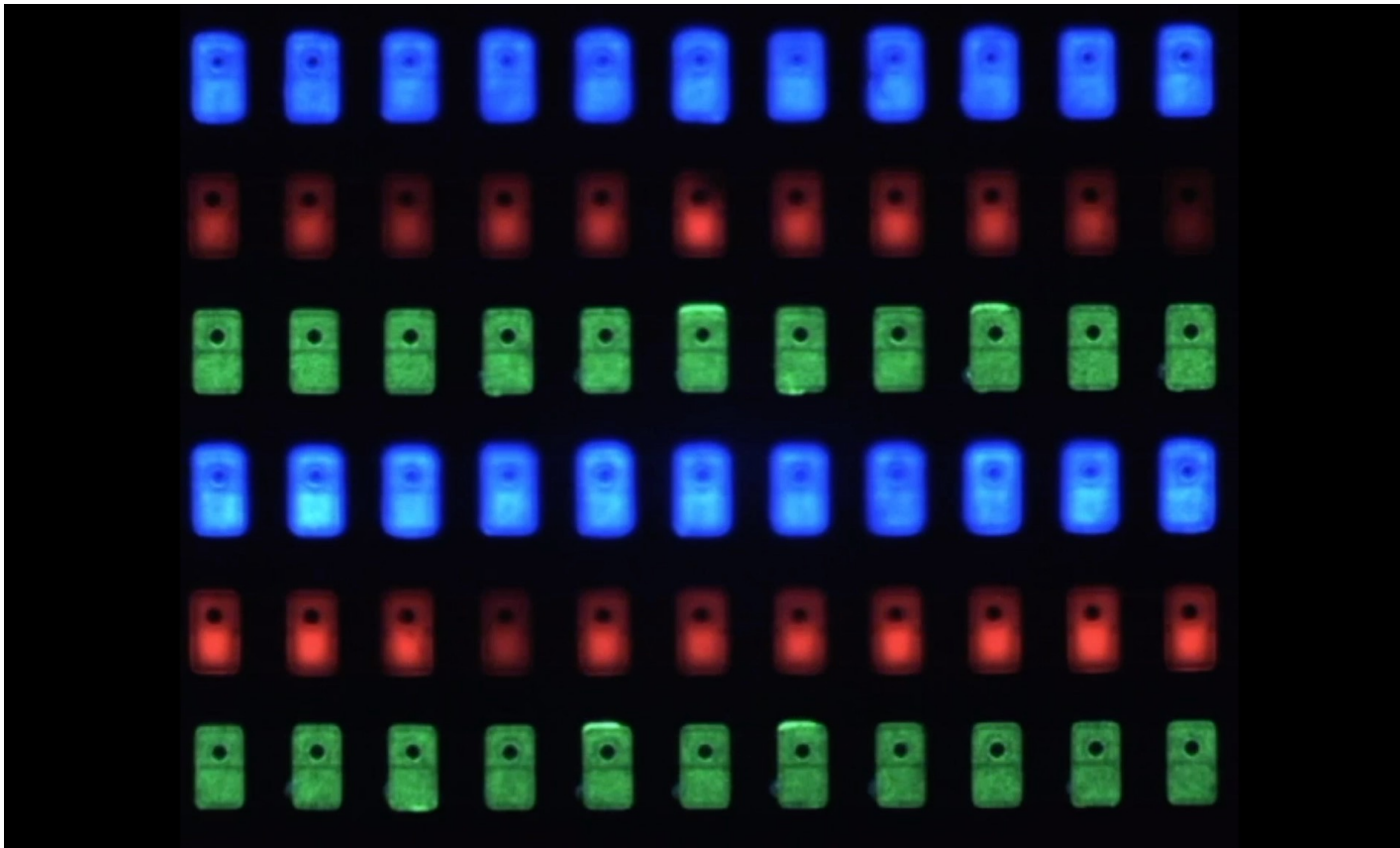


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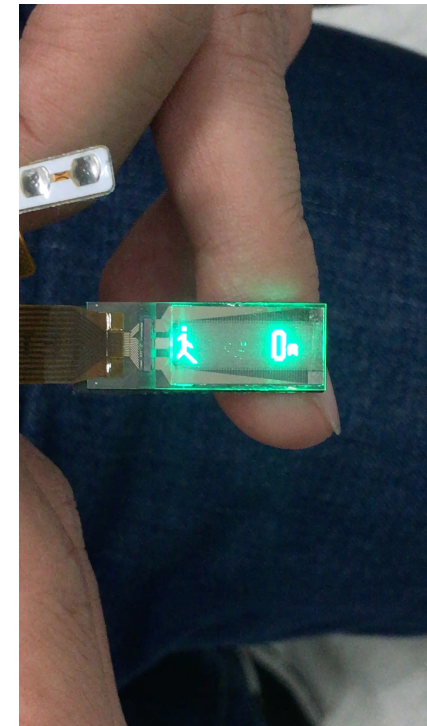
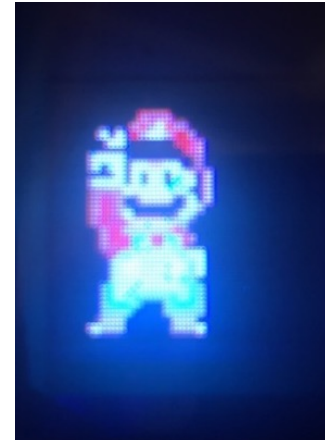
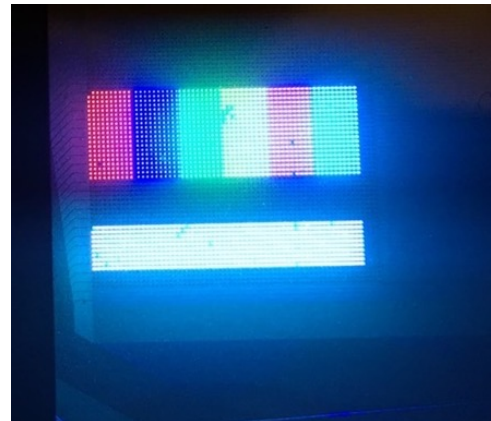
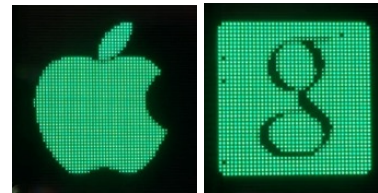
PlayNitride progress on MicroLED technology from 2016 to 2024

PixeLED® Display in 2016



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PixeLED® Display in 2017



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PixeLED® Display in 2018



5"

350 x 170 (80ppi, ~55" 4K)
180K MicroLED chips
115% NTSC / Full Color (R+G+B LED)
Transparency: 50%



3.12"

256 x 256 (232dpi, ~retina notebook)
786K MicroLED chips
Full Color (R+G+B LED)
115% NTSC

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PixeLED® Display in 2019



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Current application – MicroLED TV (CES 2020)



(images from Samsung Newsroom and internet)

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Current application – Automotive (cluster/CID/HUD) 2020

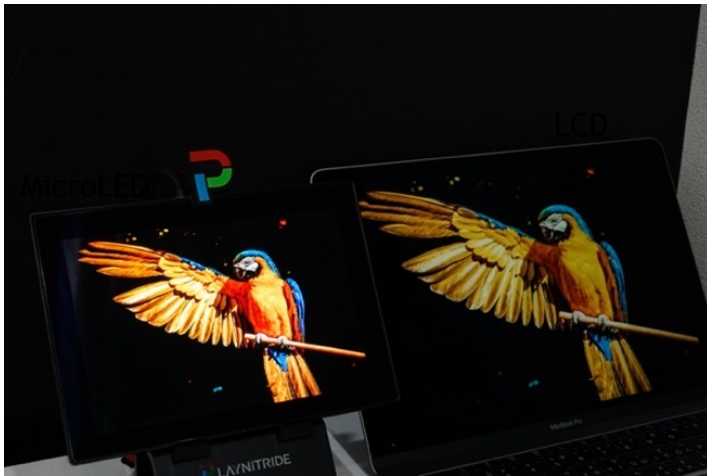


(images from AUO website)

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MicroLED on TFT (Rigid type) 2021



- 7.56"
- 720 x 480 (114ppi)
- 1,000nits full (2500 nits peak)
- 120% NTSC / 90% BT.2020
(MicroLED + QD color conversion)

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MicroLED on TFT (Circular type) 2021



1.39" 338ppi
MicroLED Circular Display

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MicroLED on TFT (Flexible type) 2022



- 14.6"
- 2560 x 1440 (202ppi)
- Rollable (Curvature radius 40mm)

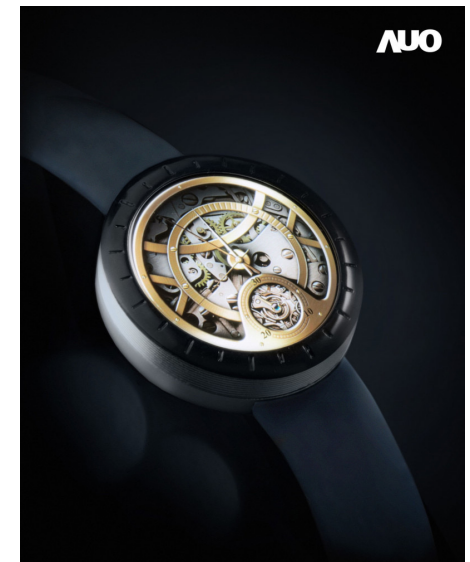


- 3.5"
- 141ppi
- >100,000 dynamic lifting test
- With Touch function

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AUNITRIDE
(images from AUNITRIDE website)

Production of TV and watch in year 2023



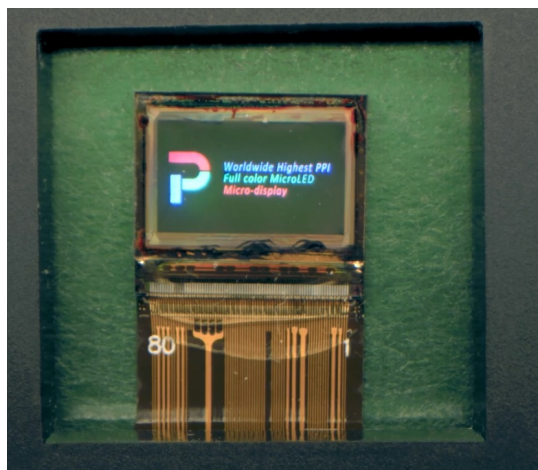
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AR顯示器

0.49" MicroLED μ -display

- 1920*1080 (FHD)
- 4536PPI
- Full Color
- >4,000,000 MicroLED 2.5 μ m chips



2023 SID 「最佳 AR/VR/MR 模組/產品
獎」 Best AR/VR/MR Demo/Product



MicroLED in CES 2024

AUO Automotive MicroLED Display



Interactive Transparent Window



Rollable Rear Seat Entertainment

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MicroLED in CES 2024

Continental creates world's first see-through car display in Swarovski crystal.



(source: Continental Press Release)

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MicroLED in CES 2024

CarUX Automotive MicroLED Display.



(source: TechNews website)

- 9.6" MicroLED
- 229 ppi (1920x1080)
- 1,000 nits

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MicroLED in CES 2024

Samsung MicroLED TV

140"

The one and only



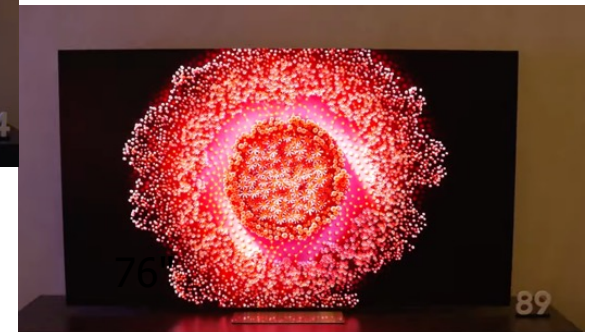
114"



101"



89"



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(source: SamMobile YouTube)

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MicroLED in CES 2024

Samsung Transparent MicroLED Display



(source: TechNews website)



(source: Tom's Guide website)

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MicroLED in CES 2024

AUO Transparent MicroLED Display

	
Size	30-inch
Tech	Micro LED
Resolution	960x540
Pixel pitch	0.69mm
Brightness	600cd/m ²
LED type	RGB/flip chip

Source: Photos taken by Omdia at CES 2024

	
Size	17.3-inch
Tech	Micro LED
Resolution	1280x720
Pixel pitch	0.3mm
Brightness	>1,200cd/m ²
Touch	TP cell = 0.5mm, 5 points

	
Size	13.5-inch
Tech	Micro LED
Resolution	1920x1080
Pixel pitch	<0.3um
Brightness	5,000cd/m ²
Pixel density	163 PPI

© 2024 Omdia

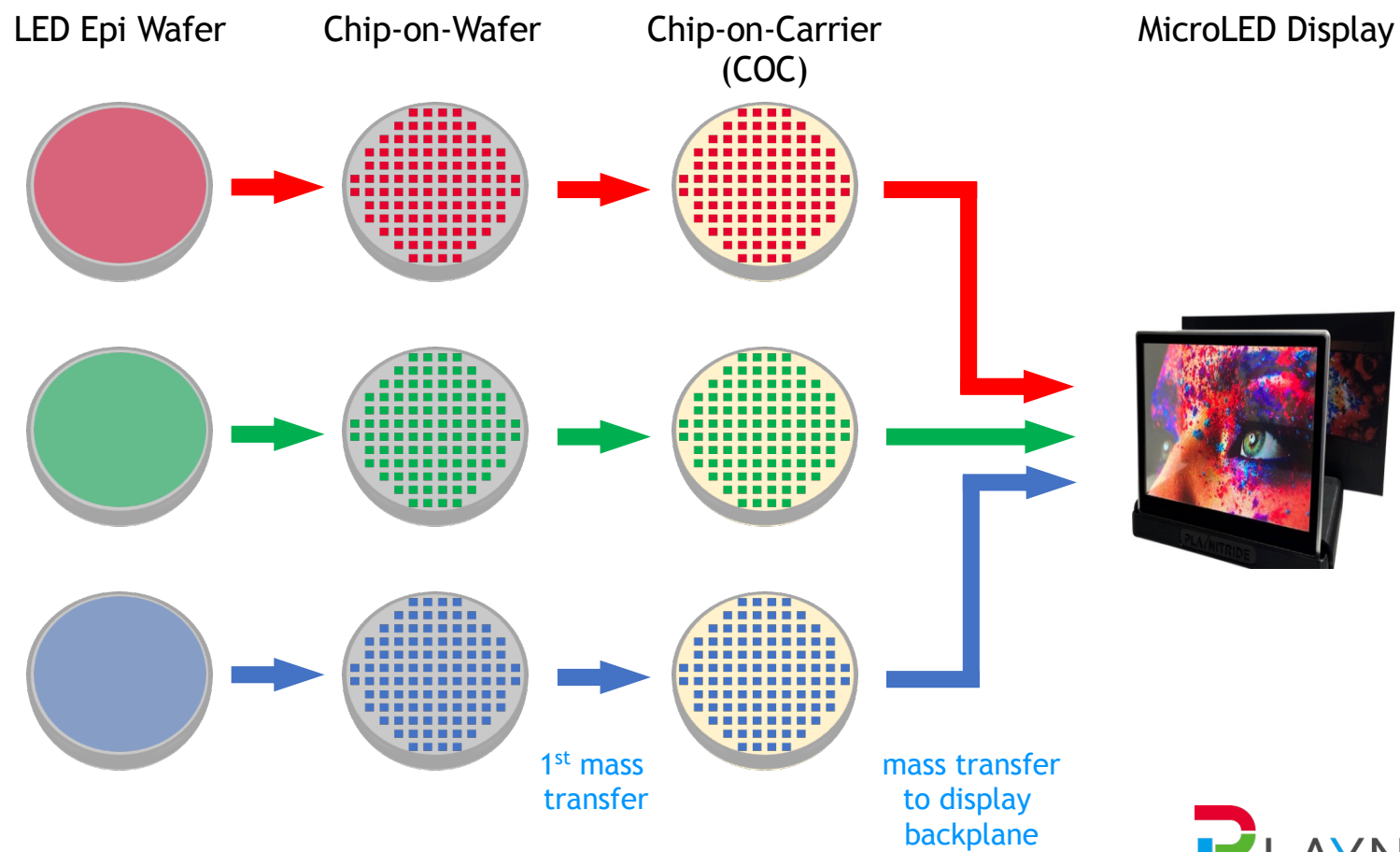
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(source: Omdia Report)



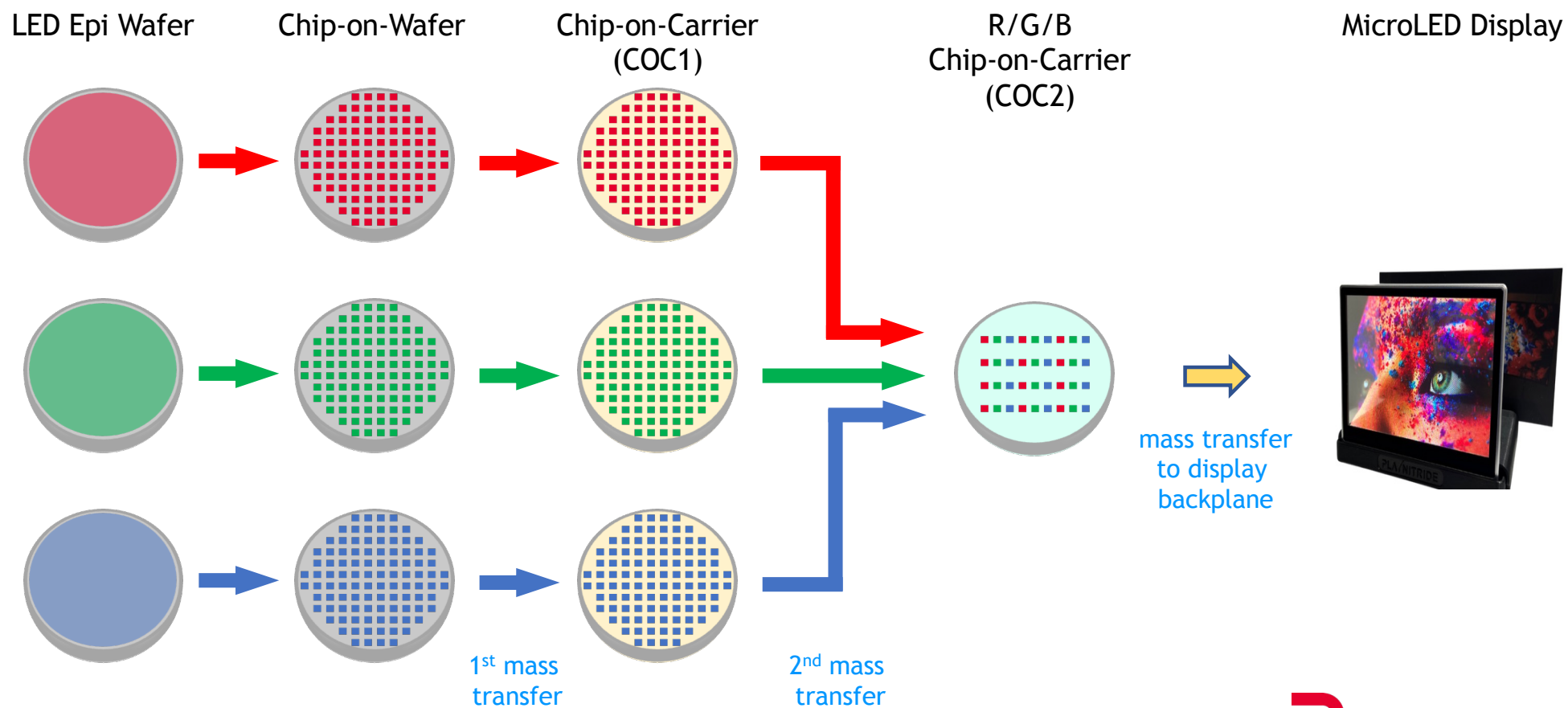
Production of microLED
display is ***not*** straightforward!

Chip-On-Carrier (COC)



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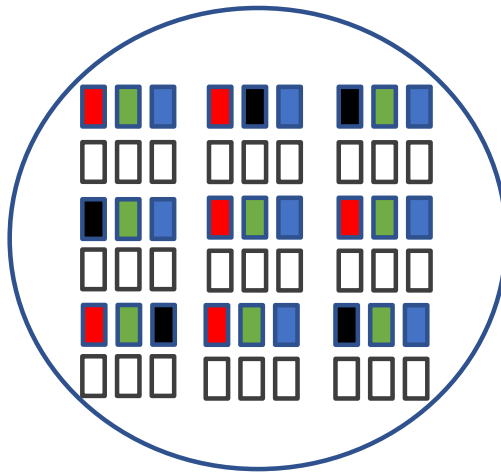
R/G/B Chip-On-Carrier (COC2)



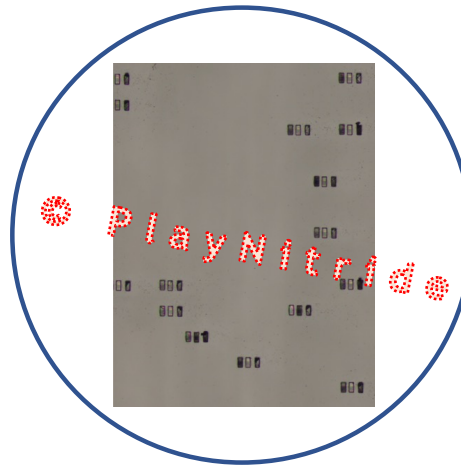
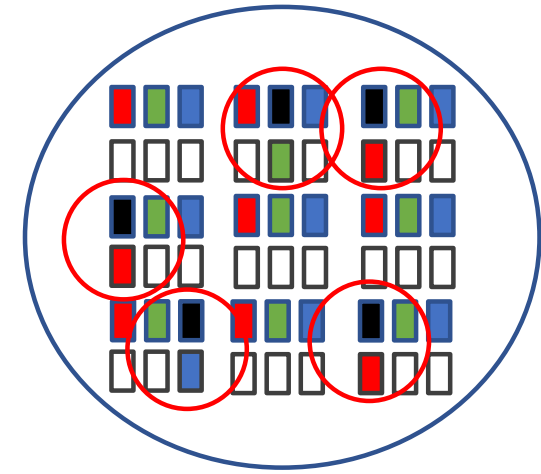
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Mass repair technology for bad pixels

Defect mapping
(after mass transfer)



SMAR-Tech repair technology



Addressed chip arrangement

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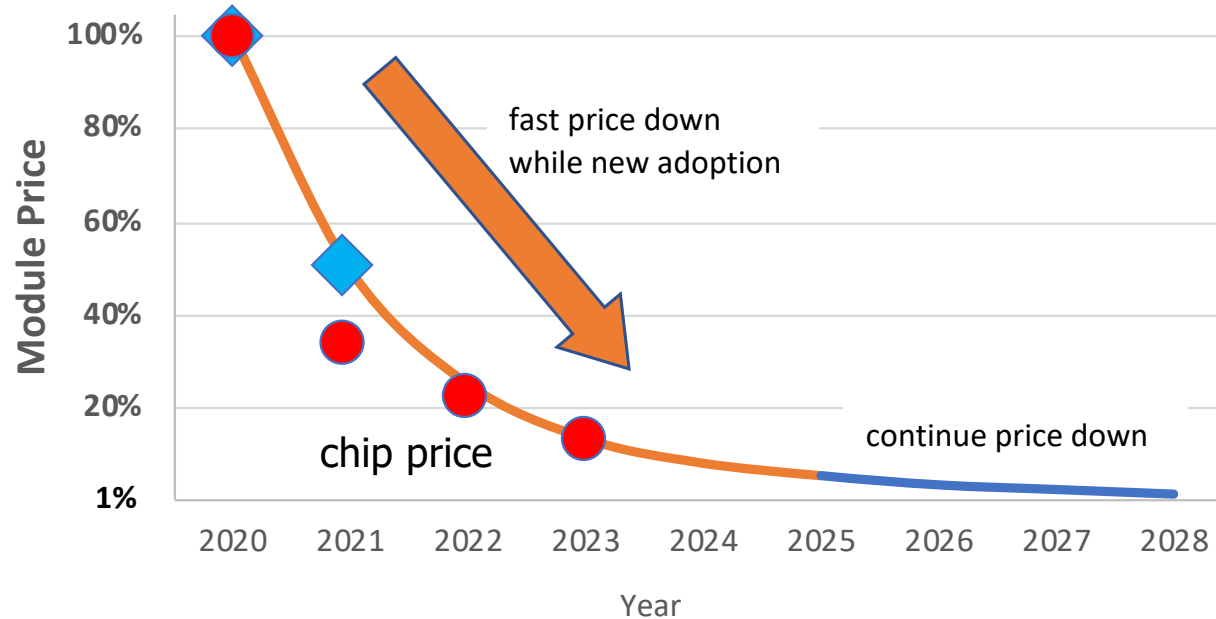
Challenges of MicroLED chip development

Size of micro LED keep going down

- Efficiency goes down?
- Non-uniform leakage current at very low current operation.

Trend of cost reduction

Display Module Price Forecast

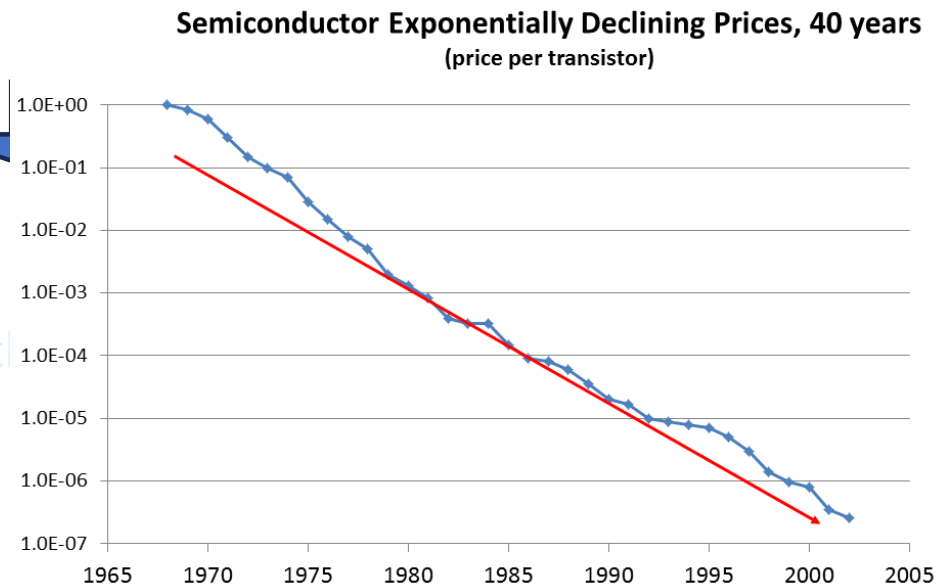
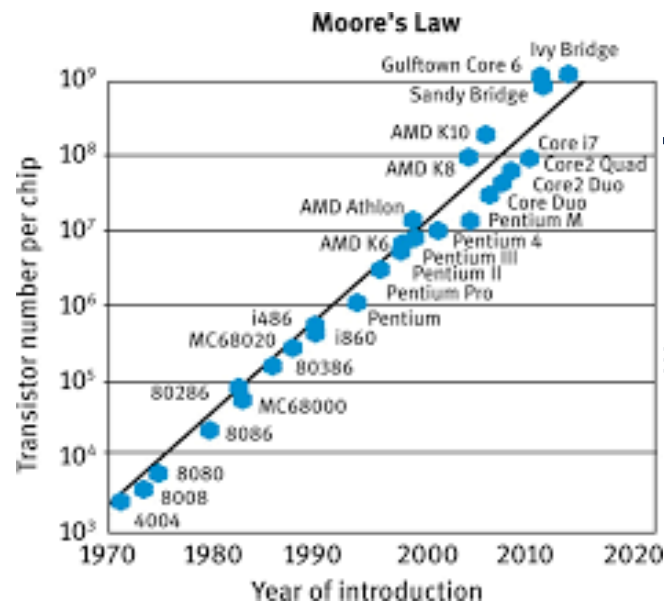


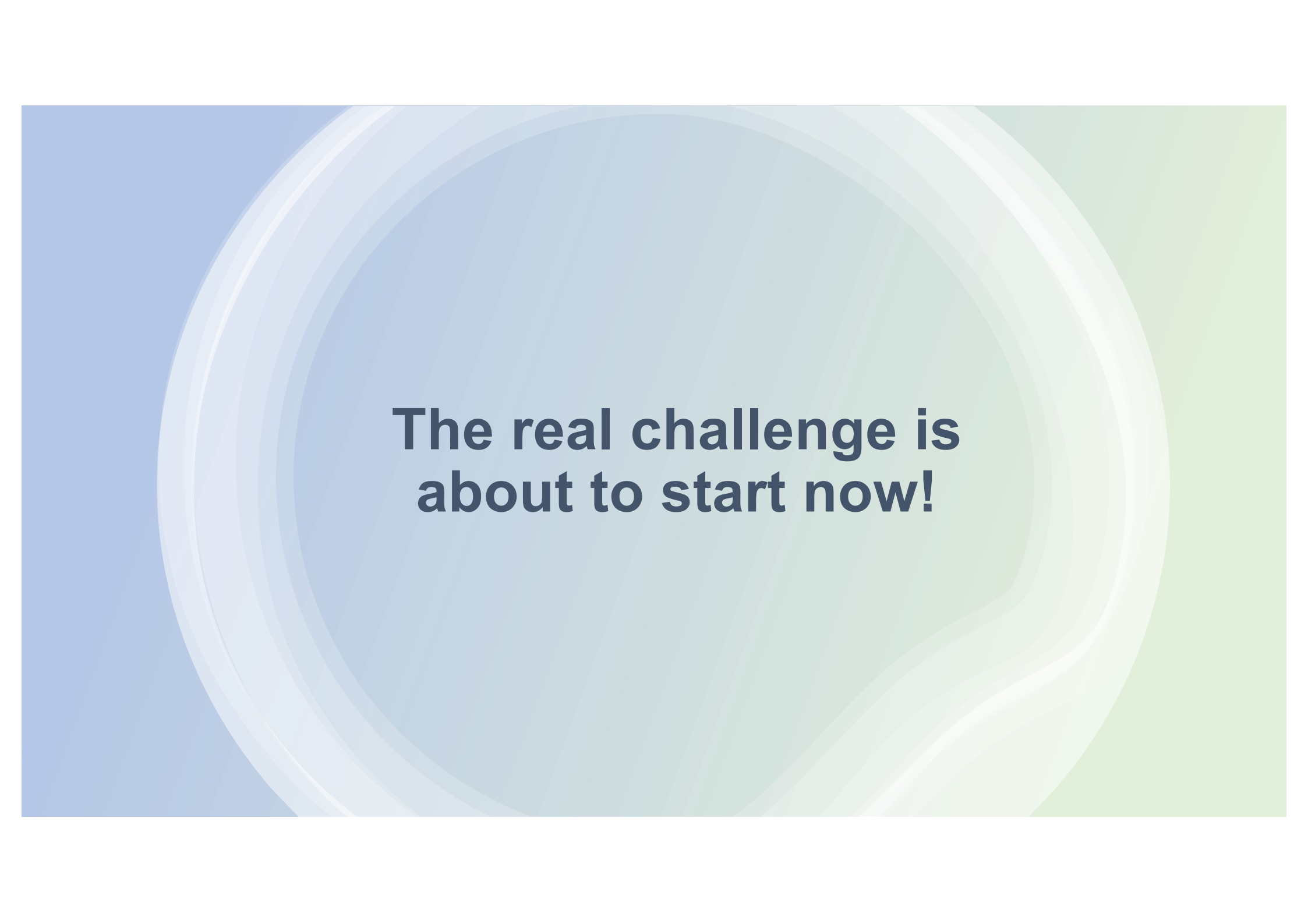
MicroLED display could lower the price by:

- Epi wafer size increase
- MicroLED chip size reduction
- Yield improvement (ex. particle, chip damage)
- Transfer speed
- Transfer yield
-

Trend of MicroLED Price Down will be similar to Moore's Law

Moore's Law projected that the ideal number of transistors per square inch on a microchip would **double** every **12-18 months** while the **manufacturing cost per transistor would be half**.





**The real challenge is
about to start now!**



The time for new technology to penetrate the market can be shortened by the consistent consensus among all stakeholders.



Cost



Market Demand

Production Capacity

Cost

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Market Demand

Production Capacity



If the development progresses slowly, it can lead to impatience in the market and shifts towards competing technologies such as OLED.

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Creative business model:

Turnkey solution provider!



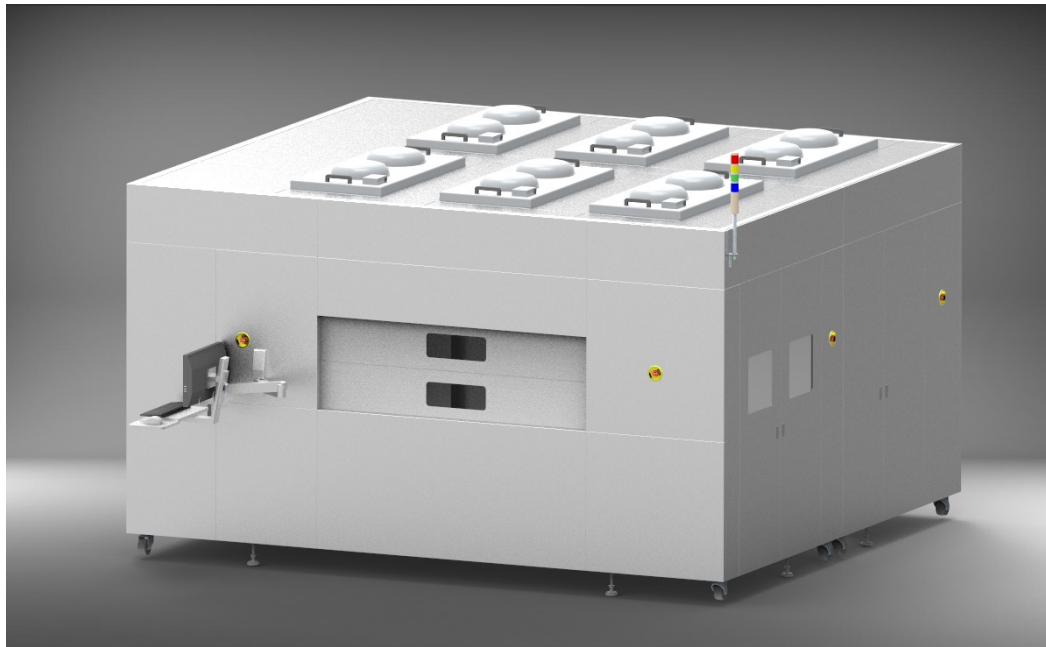
To compete with OLED industry

At this moment, both capacity and cost are of great importance.

However, **CAPACITY** readiness is more important!

Partners are very important! Everyone is welcome to join MicroLED industry!

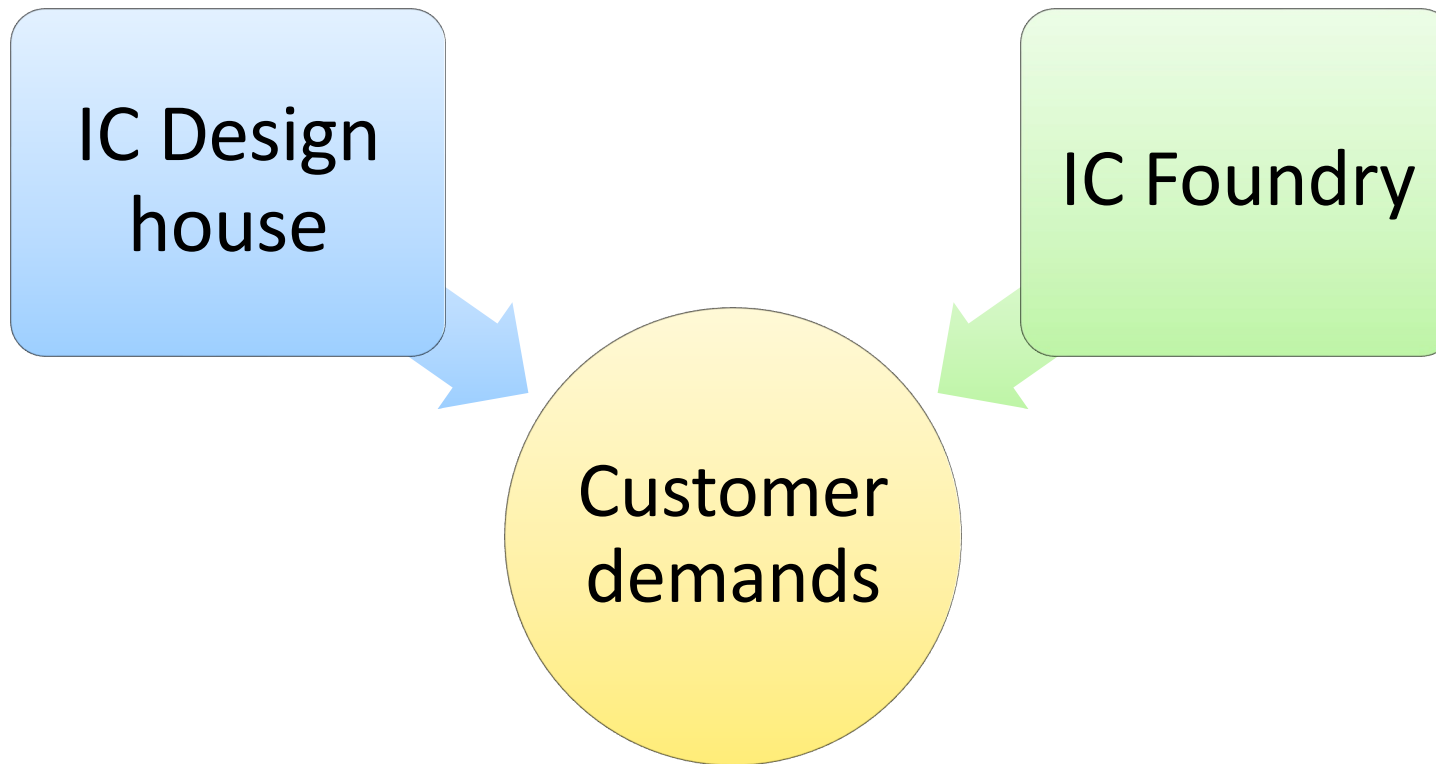
Fully automation system for mass transfer production



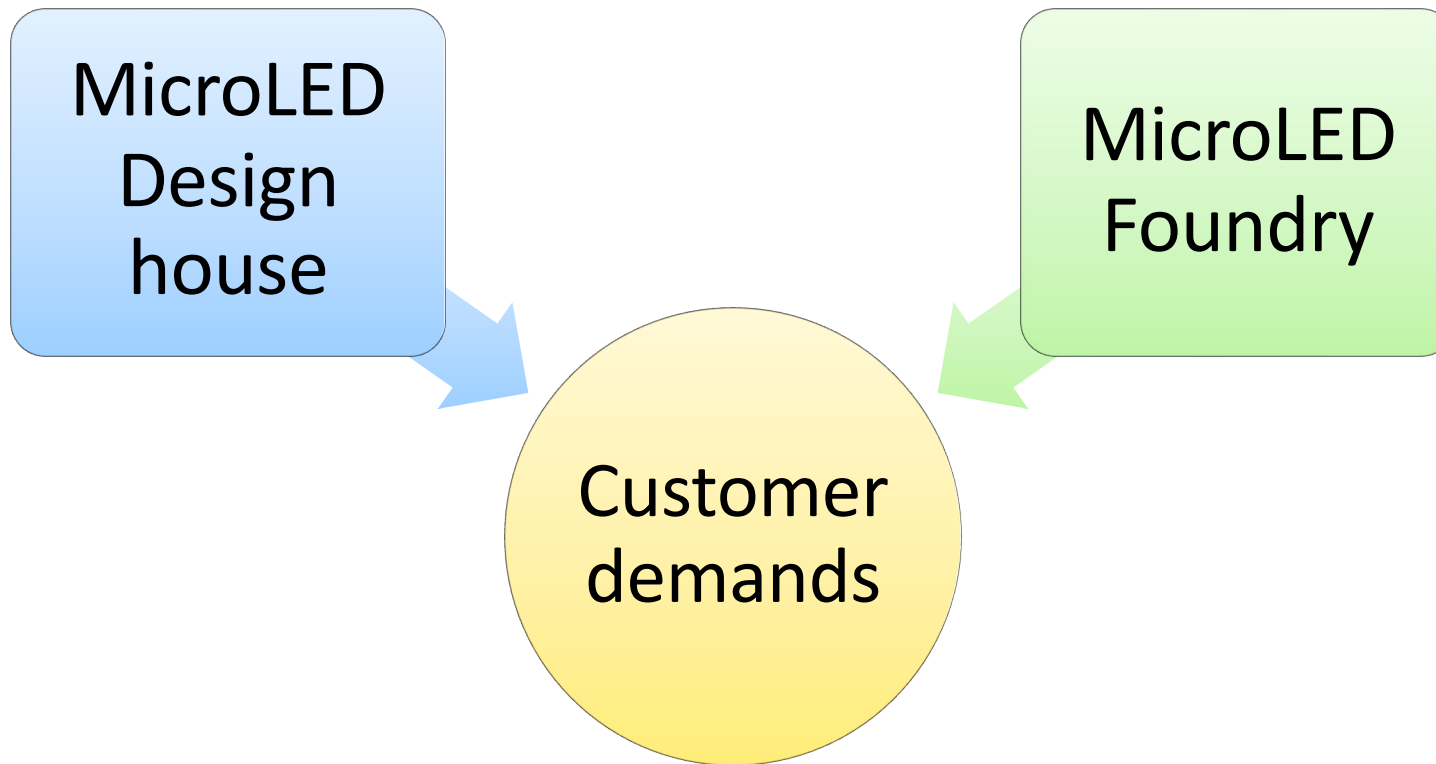
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What we have learned from semiconductor industry



What we have learned from semiconductor industry



To compete with OLED technology

Novel type of microLED design

Revolutionary product

Cd/A increase

Power saving

Outperform OLED on Power consumption and lifetime **without any change of panel design.**



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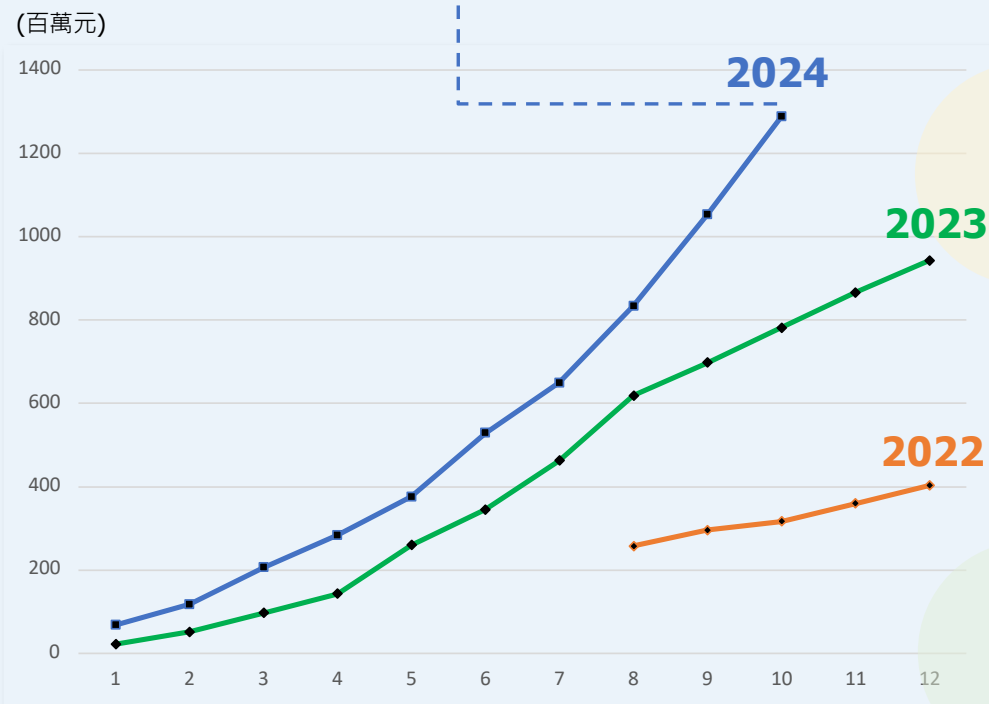


財務表現

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月營收及EPS表現

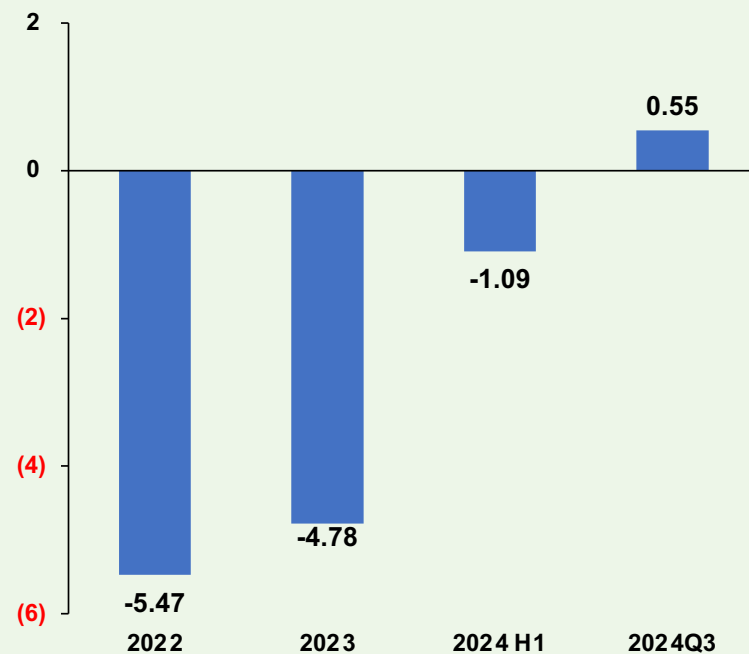
2024年的累計營收持續超過2023年同期的表現



月營收(累計合計)

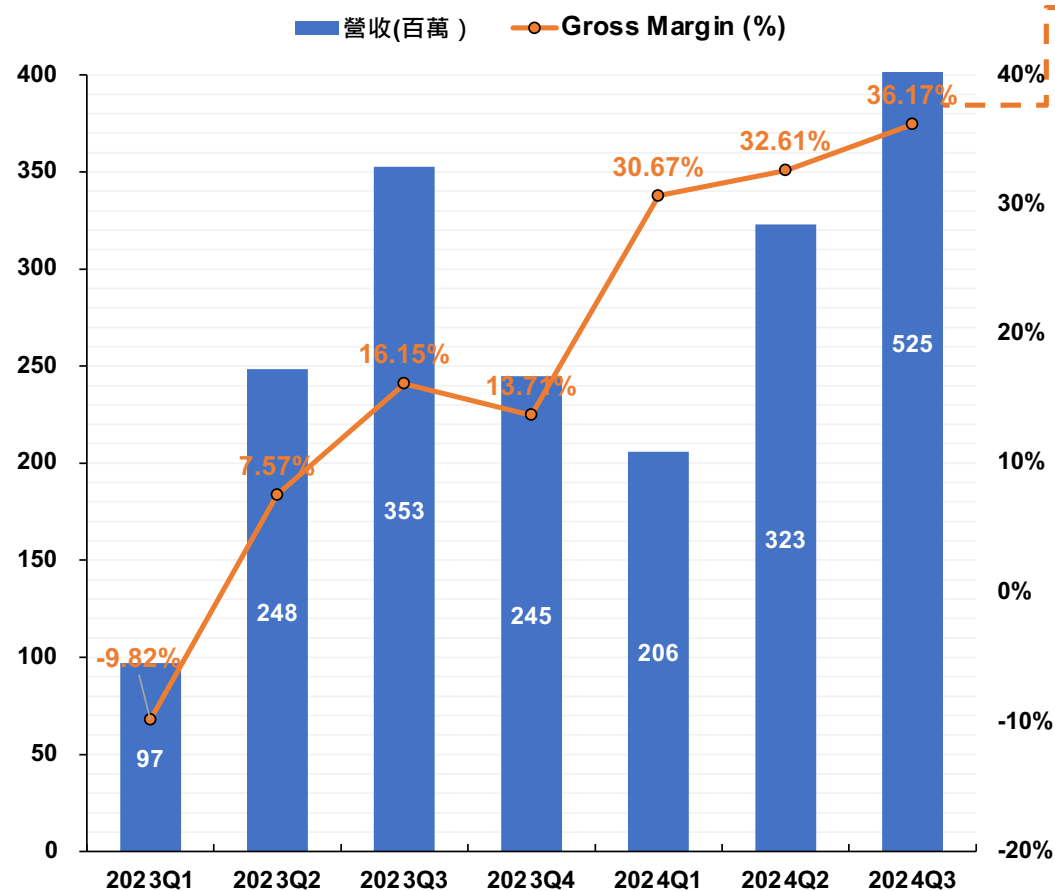
- ✓ 營收增加，維持營收動能趨勢
- ✓ 虧損逐步降低，**EPS**持續改善

[註] 匯兌損益：2022 NTD 207million, 2023 NTD (7.17 million)



EPS

產品毛利率表現



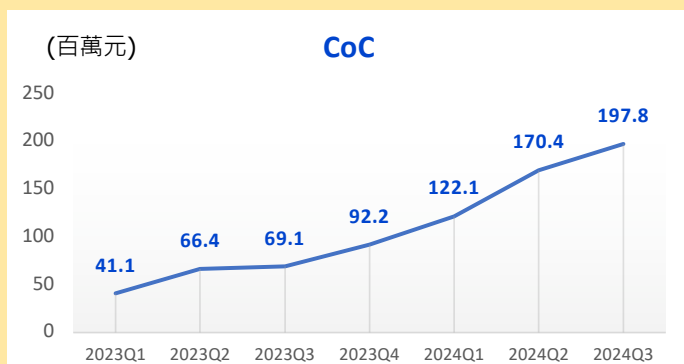
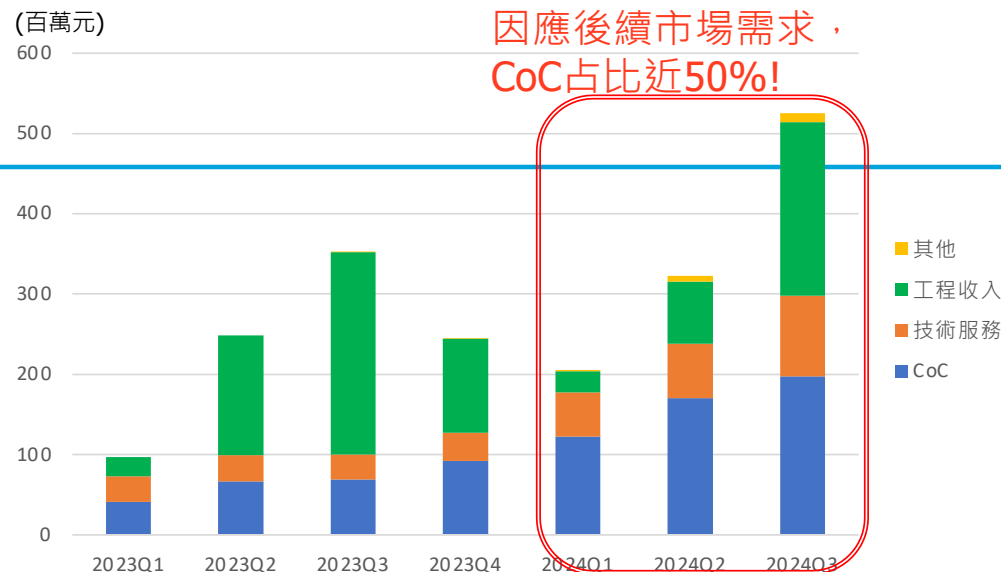
2024年毛利率顯著提升

- ✓ 製造費用下降
- ✓ 新營業項目/新客戶的挹注

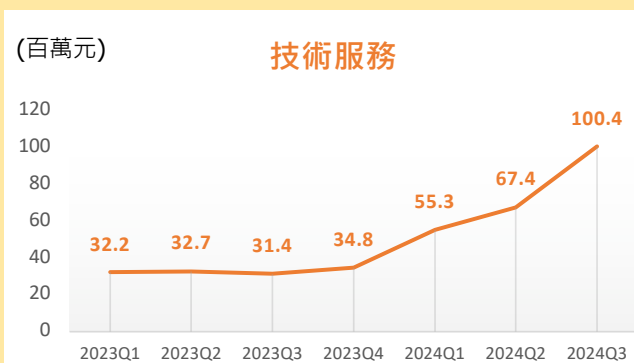
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分項營業比重

(2023Q1~2024Q3)



CoC業務逐步增長，
穩定的上升趨勢



客戶增加 / 量體擴大
2024年技術服務收入提高



工程收入採用完工比例法認列，
因此收入上下波動較大。

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THANK YOU

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