



# ~~~~Metal Mesh Touch Sensor~~~~

“Bison Copper Mesh”



*The way of TP  
revolution,  
we drive it!*

HWL (黃威龍)

[w.l.huang@Bisonoptronics.com](mailto:w.l.huang@Bisonoptronics.com)

# 42" Metal Mesh Touch Panel



## Motivation:

1. Considering the price of ITO film, capacitive TP above 15" is no price-advantage.
2. Size above 15", film sensor resistive is too high to design. Double routing will cause the BM wider.
3. Size above 15", IC resistive will increase route numbers in route area. Route width needs to be 30um / 30um.
4. Metal Mesh is developed to replace ITO by Fuji film, Panasonic, 3M and Atmel.

## Conclusion:

Using copper-etching process can replace ITO, solve the design issue and develop Metal Mesh. Also, we can use its price advantage to compete with other companies in US and Japan.

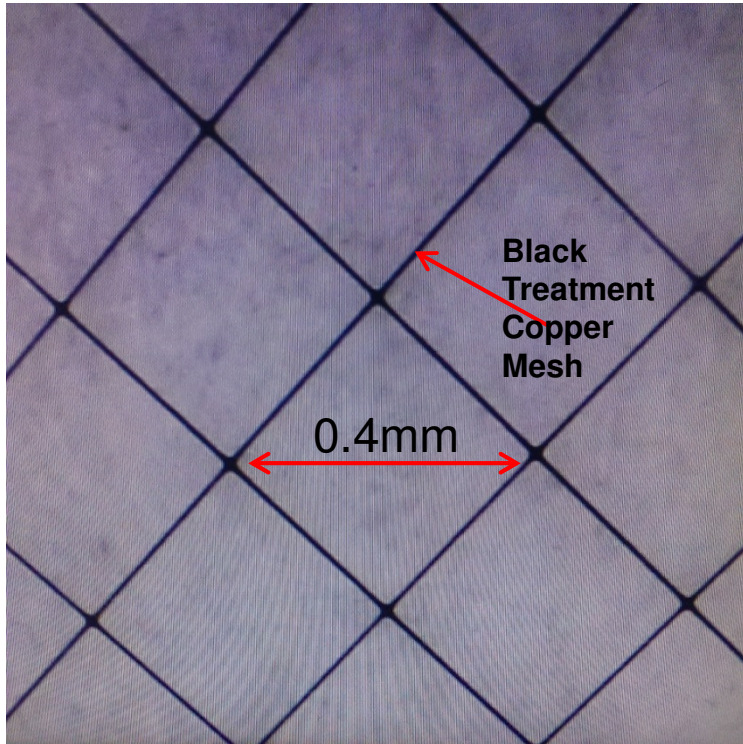


## Metal Mesh Advantage:

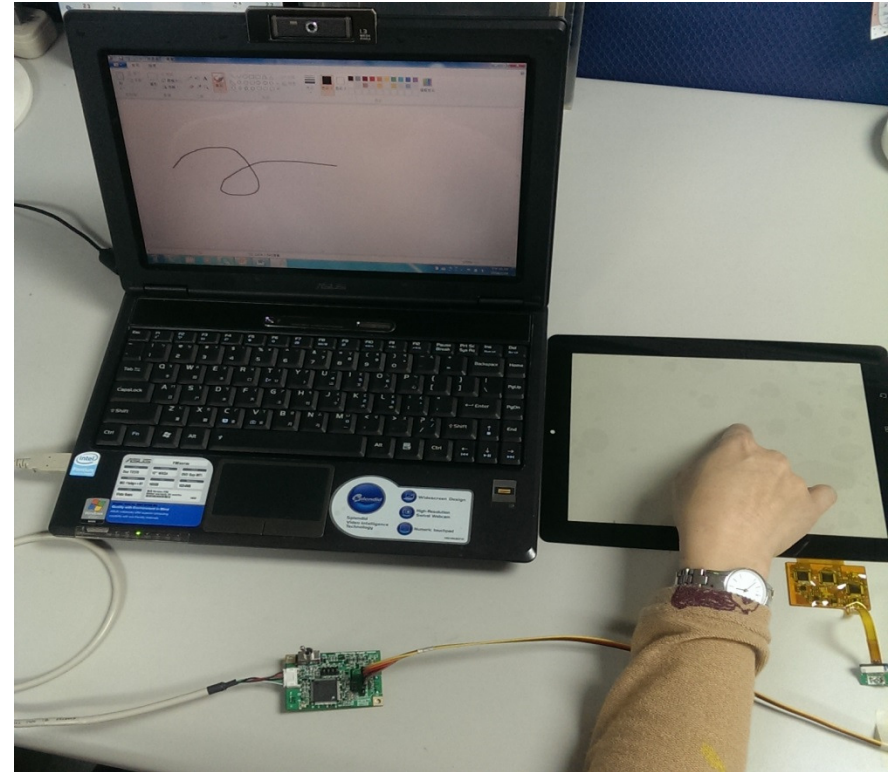
1. If choosing metal route to replace ITO, the cost of film sensor can be cost-down 30%. Especially for the TP size above 15”.
2. Etching process can make traces and Metal Mesh at one time. The process is short and the cost is low.
3. Resistive is low, so double routing is not necessary. The design can be simple. Etching process can achieve thin traces, and BM will be very thin as well.
4. Resistive is low, so 70” is possible.
5. According to the low resistive, The TP sensitivity is better. Touch signal and anti-interference are better than ITO Sensor!



~~Metal Mesh Projected Capacitive Touchscreen~~  
Function Confirmed

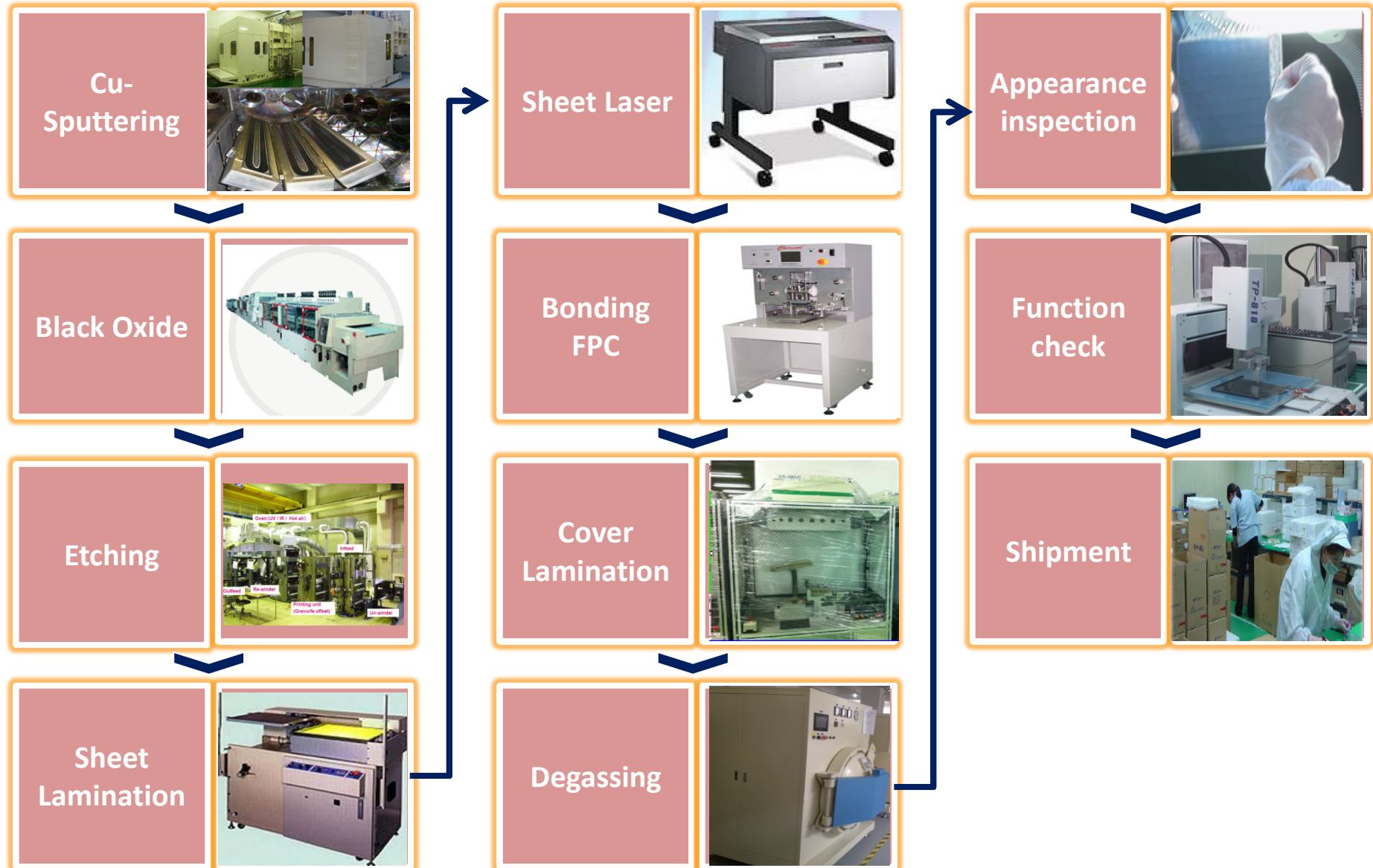


Transparent Conductive Film  
(Copper (Cu) Mesh)

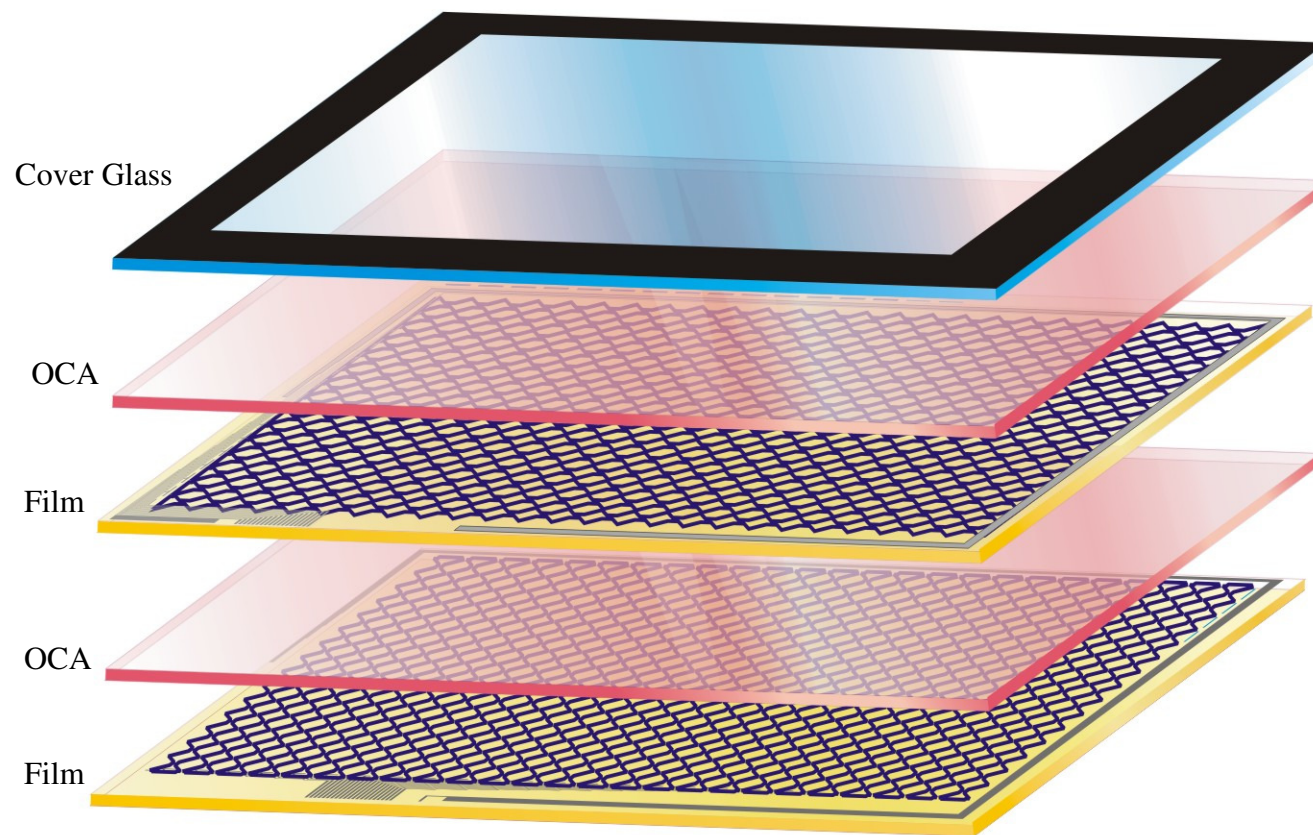


Transparent Conductive Film Touch Panel  
(Copper (Cu) Mesh)

# Metal Mesh Process



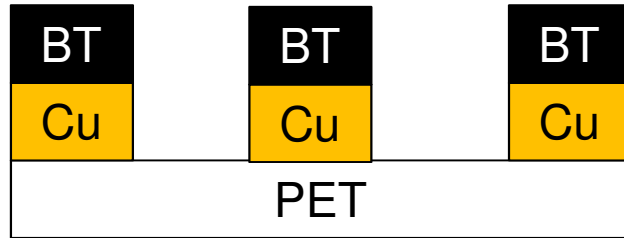
## Metal Mesh PCAP TP Structure



Technical Capacity:

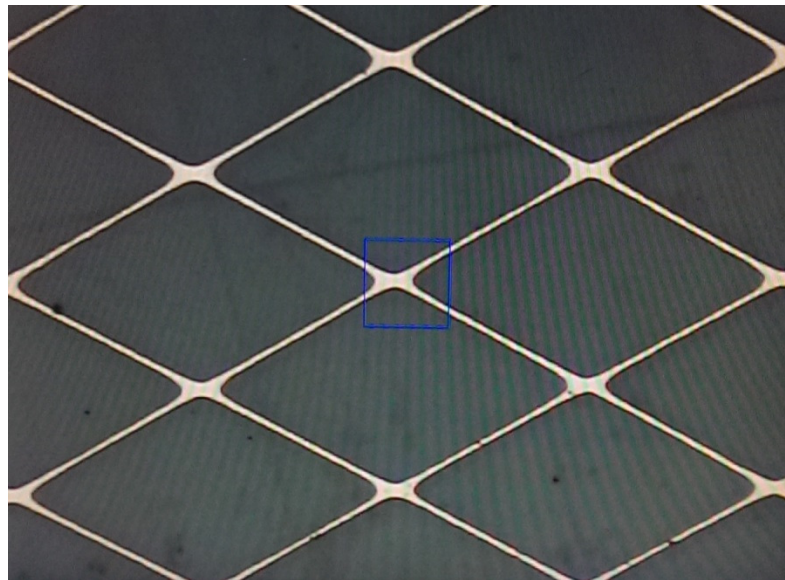
1. Photo Image etch(Active Area):  
Copper  
Linewidth/Line  
Pitch : 3~6um  
/200um~600um
2. Photo Image etch  
(Border Area):  
Copper  
Linewidth/Line  
Space : 30um /30um

# Copper Black Treatment

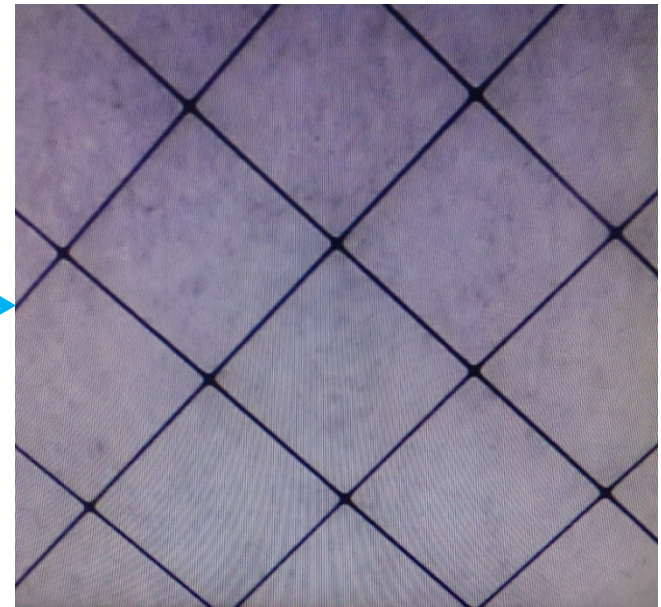


BT: Black Treatment

- Black Treatment:
1. Anti-Oxidize
  2. Anti-Reflection
  3. Enhance Transmittance

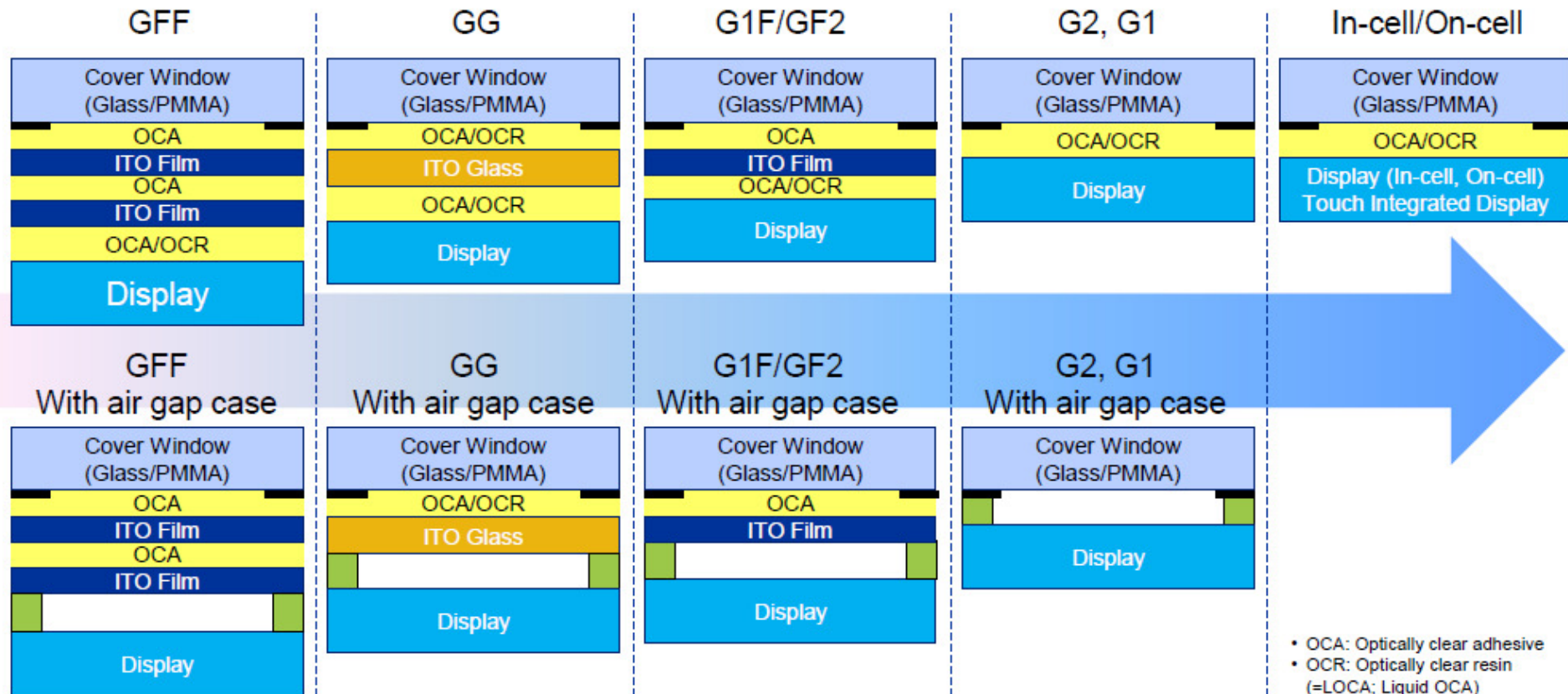


Black Treatment



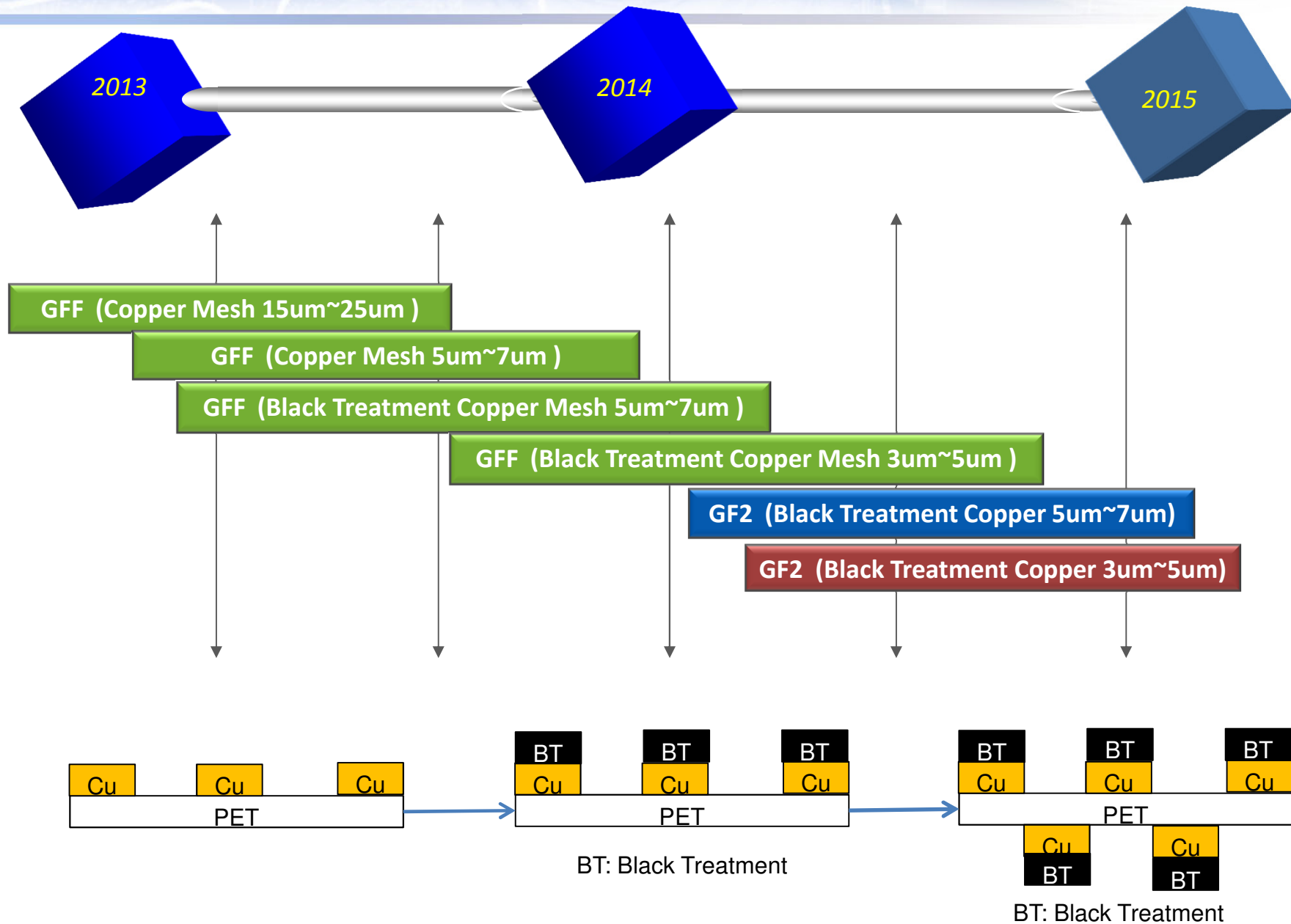


## <Touch Layer Structures>



\* Typical layer structure figure. The actual structure is even more diverse and complicated since shatterproof film, and a separate deco film can be attached

# Metal Mesh Develop for Invisibility



## Concern and Solution for Metal Mesh

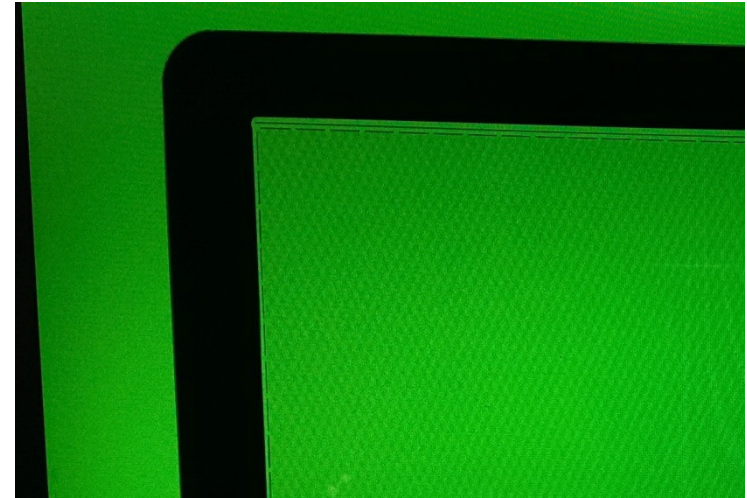
### Metal Mesh Improves Optical Issues:

1. Optical features: Optical issues can be solved by process ability. Light transmittance and haze are similar to film sensor.
2. Moire effect can be avoided via design.
3. Pattern Visible: Making thin trace ( $5\pm 2\mu\text{m}$ , mask improving can achieve  $3\mu\text{m}$ ) via etching Process can solve this problem.

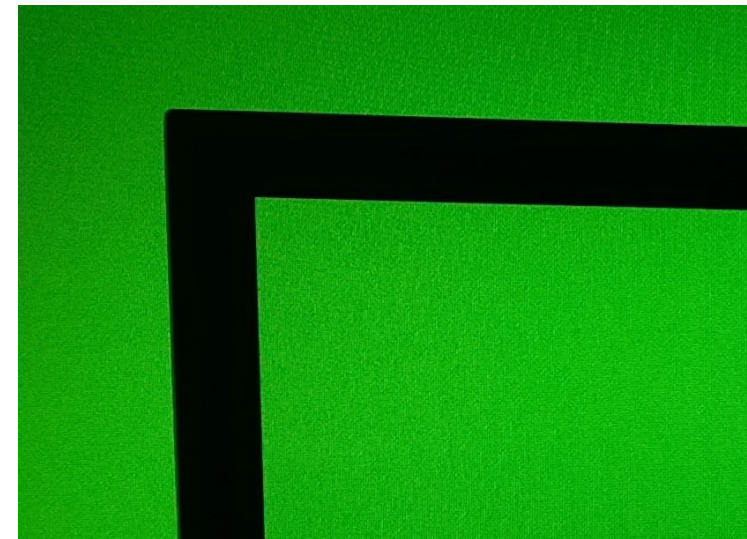


1. Moire Pattern: Overlapping Palisade fringes cause the interference images.
2. Metal Mesh is full of untransparent traces. The traces overlap with the LCD color filter can cause interference images as the upper right photo.

Ways to improve: Random pattern design can improve this issue. We have conquered this problem!


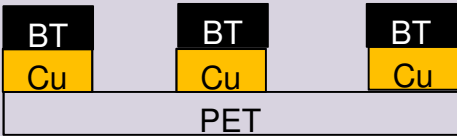
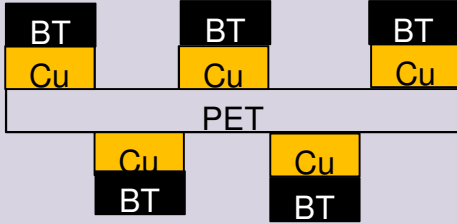


Moire Pattern - Before



Moire Pattern - After

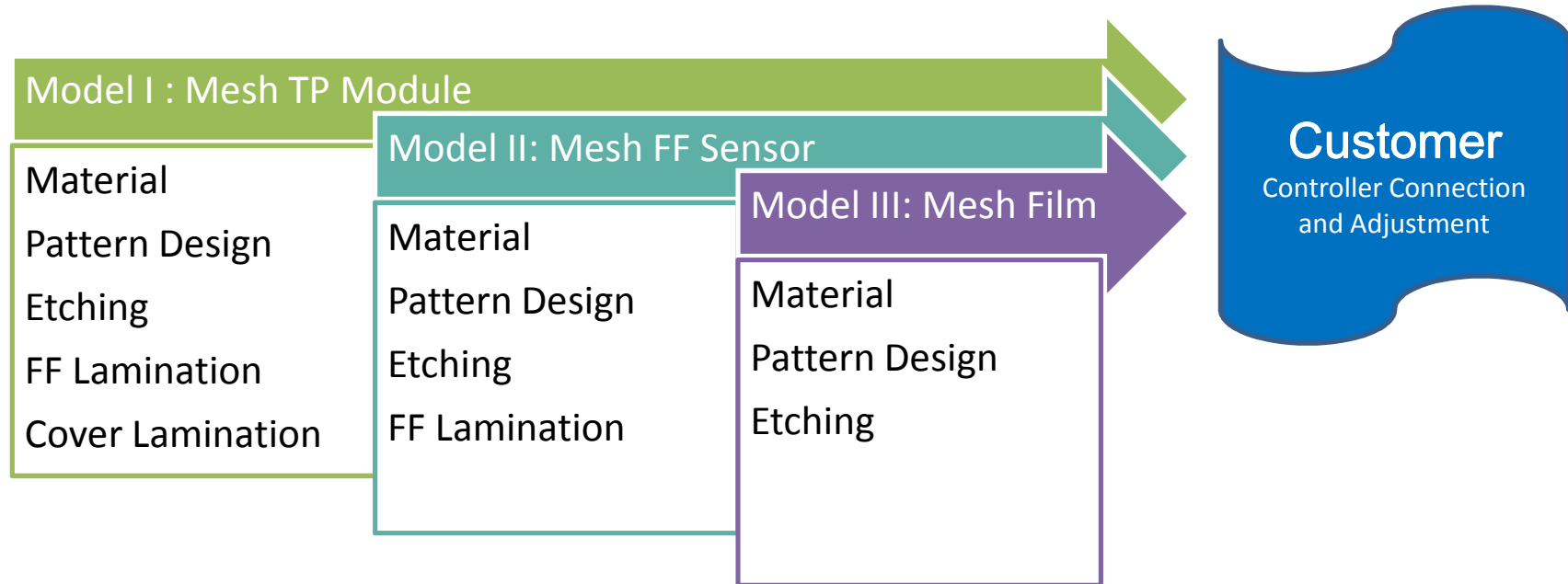
# Specification for Gredmann Copper Mesh

Item	GFF Type	GF2 Type
<p>Cu Film Structure</p> 	 <p>BT: Black Treatment</p>	 <p>BT: Black Treatment</p>
Line Width (Active Area)	$\geq 5\mu\text{m}$	$\geq 5\mu\text{m}$
Line Space (Border Area):	Min. 15 $\mu\text{m}$ /15 $\mu\text{m}$	Min. 30 $\mu\text{m}$ /30 $\mu\text{m}$
Mesh Pitch	0.1mm~1mm	0.1mm~1mm
Transmittance	< 90%	< 90%
Haze	< 2%	<2%
Moire	Moire Free	Moire Free
Sheet Resistance (before Patterning)	<0.02 $\Omega/\square$	<0.02 $\Omega/\square$
Film Sensor Thinkness	0.3~0.4mm (With OCA)	0.25mm(With OCA)

## Specification for Gredmann Copper Mesh

Item	Electrode Formation	Line Width (um)	Sheet Resistance ( $\Omega$ )	TP Max. Size (in)	Transmittance /Haze(%)	Tracing Process
<b>ITO Film /ITO Glass</b>	Printing Resist /Etching	Transparen ce	Film:150 Glass:60	20	88%/ 2%	Another Process
<b>Printing Mesh</b> (Korea TP Company)	Ag Paste Printing	10~20	0.02	50	85%/3%	Make by Sensor Patterning (One Process)
<b>Ag –nano Wiring</b> (TPK&Cambrios / Carestream)	Etch	Transparen ce (Ag Haze)	60~100	20	88%/5%	Another Process
<b>Ag-halide Wiring</b> (Fuji Film)	Photograph ic	5~10	50	20	88%/2%	Make by Sensor Patterning (One Process)
Bison Copper Mesh	Photo image Etcging	5~7	0.02	70	88%/2%	Make by Sensor Patterning (One Process)

# Our Business Model





Thank you !

