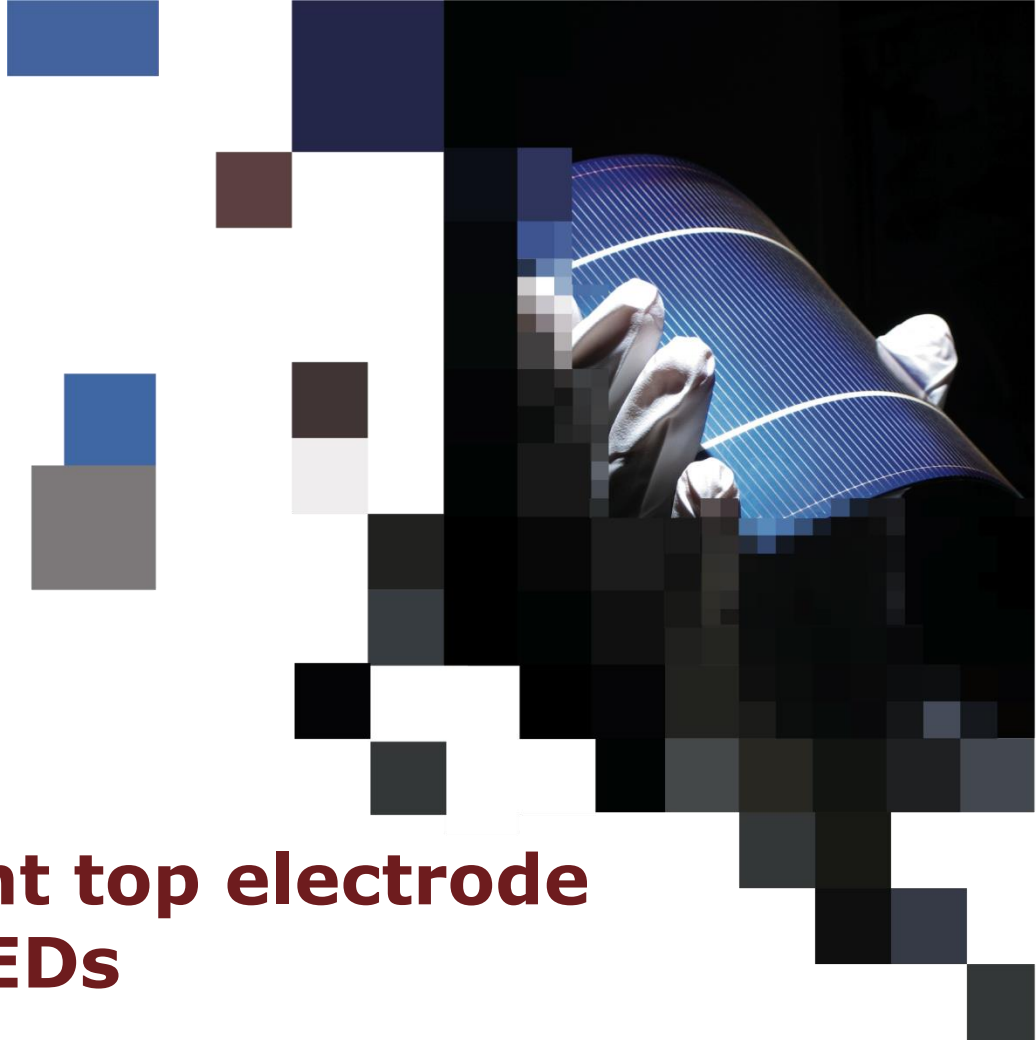

ITO-free transparent top electrode for top emitting OLEDs

Ing. Inge Verboven

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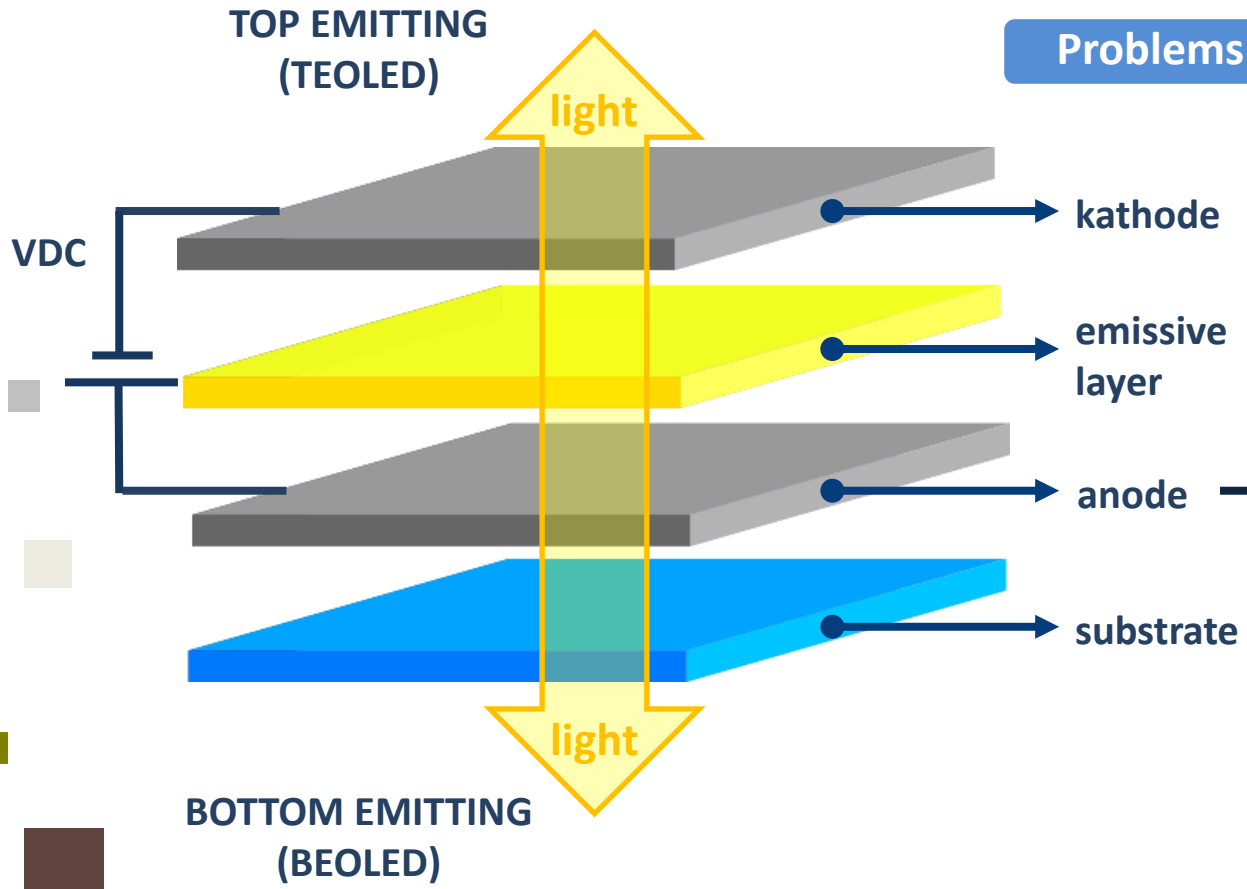
OLED with ITO

Structure Organic Light Emitting Diode (OLED)



Problems with Indium thin Oxide (ITO)

ITO

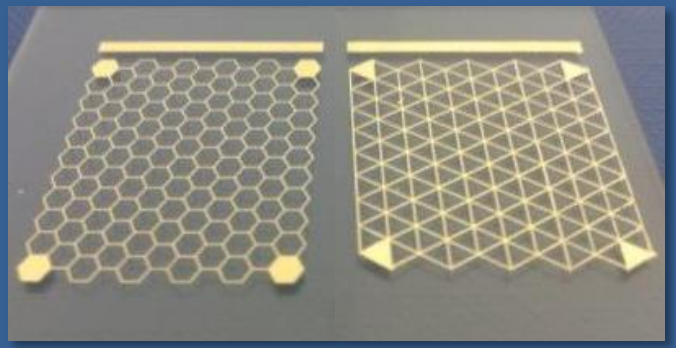
- Expensive
- Crack formation
- Can not be a top electrode

Semi transparent metal layers ↔ metal grids

Au layers

- Thermal evaporation
- **Layer thickness 1-15 nm**
- Sheet resistance 3,2-123,7 Ω/□
- Transparency 25-70 %

Ag grids



- **Ink jet printing**
- Layer thickness 150-250 nm
- **Sheet resistance 0,82-2,7 Ω/□**
- **Transparency 70-90 %**

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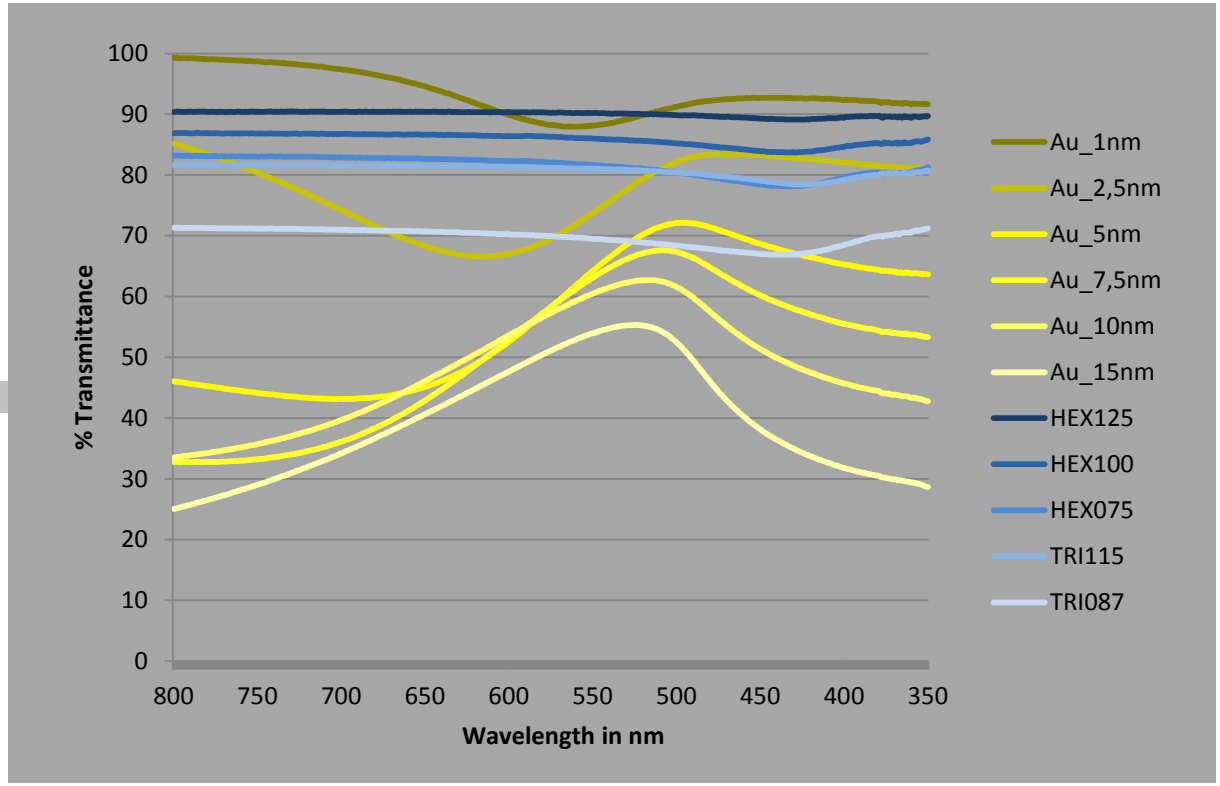
Semi transparent metal layers ↔ metal grids

Transmittance

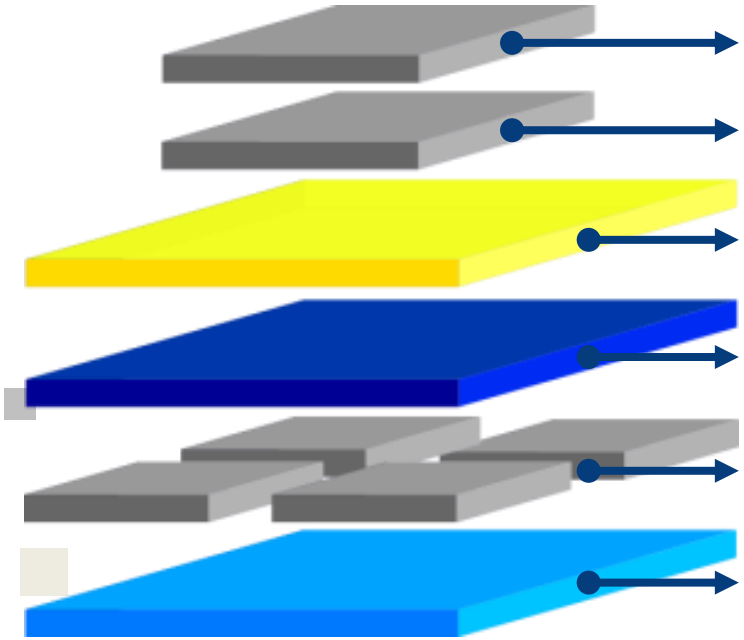


Conductivity

	Rs (Ω/□)
HEX125	2,7
HEX100	1,5
HEX075	1,5
TRI115	1,2
TRI087	0,82
Au 1nm	> 20M
Au 2,5nm	> 20M
Au 5nm	> 20M
Au 7,5nm	123,7
Au 10nm	11,5
Au 15nm	3,2

BEOLED with Ag line grid

Testing of a BEOLED with Ag grid



evaporated Al 80 nm

evaporated Ca 30 nm

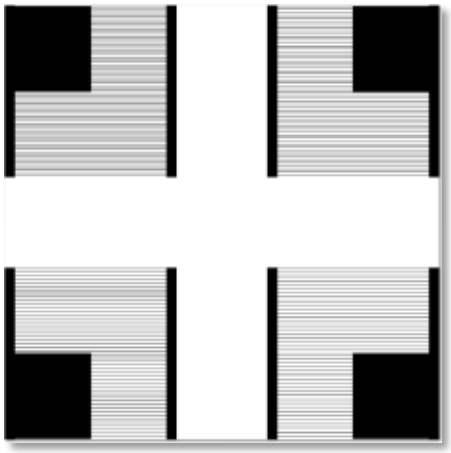
spin coated Super Yellow 80 nm

spin coated PEDOT PSS 35 nm

ink jetted Ag grid 150-250 nm

substrate glass

Sintered at 200 °C
Problem with TEOLED!
Sintering damages other layers!



Conclusion

Au layers ↔ Ag grids

- Ag grids: higher transmittance, conductivity and less expensive and faster technique (ink jet printing)
- Au layers: thinner and smoother layers

→ Ag grid best option

BEOLED with Ag line grid

- Works
- Lower light intensity and efficiency

→ Optimization of structure and layer thickness necessary

→ Sintering Ag grid without damaging other layers of TEOLED

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