# EFFECT OF UV/OZONE TREATMENT TIME ON PENTACENE THIN-FILM TRANSISTORS



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#### > INTRODUCTION

Organic materials due to their low process temperature and compatibility with flexible plastic substrates are becoming the cost efficient substitutes to inorganic materials. Their ability to be applied over large areas makes them attractive for large-area electronics. Their applications range from flexible displays to solar cells, sensors and RFID tags.

### **➢ OBJECTIVE**

To develop low-temperature process for low-voltage p-channel transistors, amenable to plastic foil substrates.

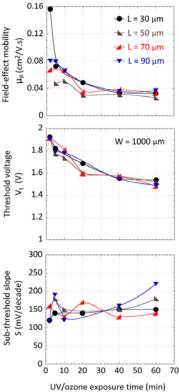
# source (gold) semiconductor (pentacene) dielectric (aluminium oxide + organic SAM) substrate (glass)

gate

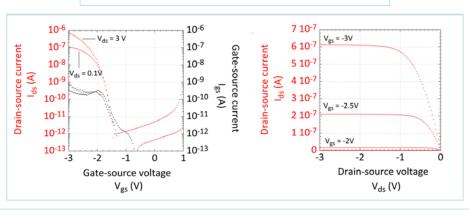
(aluminium)

## > EXPERIMENT

- AlO<sub>X</sub> prepared by UV/ozone exposure of aluminium gate
- Varied UV/ozone exposure time between samples
- All other transistor layers are identical
- Transistor dimensions: channel width W = 1000 μm channel length L = 30, 50, 70, 90 μm



# > TRANSISTOR TRANSFER AND OUTPUT CHARACTERISTICS

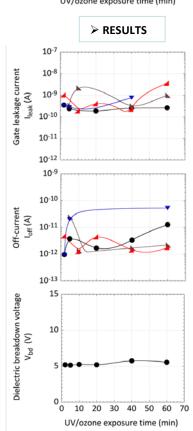


### > TRANSISTOR PERFORMANCE

Field-effect mobility  $\mu_p$  = 0.04  $\rightarrow$  0.16 cm<sup>2</sup>/Vs Threshold voltage V<sub>+</sub> = -1.5  $\rightarrow$  -1.9 V On-off current ratio I<sub>on</sub>/I<sub>off</sub> ~ 10<sup>6</sup> Sub-threshold slope S ~ 150 mV/decade

# > CONCLUSIONS

- Field-effect mobility and the threshold voltage decrease with increasing UV/ozone time
- UV/ozone time has little effect on the off-current, gate leakage current, sub-threshold slope, and the gate dielectric breakdown voltage.



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