In-situ observation of electrodes formation on the non-fullerene organic solar cells by GISAXS technique

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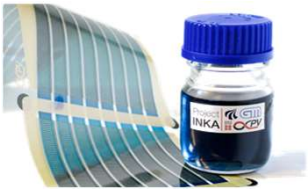
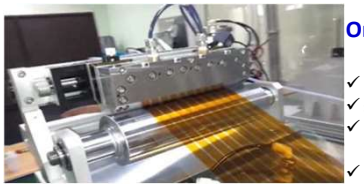
Organic solar cells



https://www.futureentech.com

https://infinitypv.com/products/

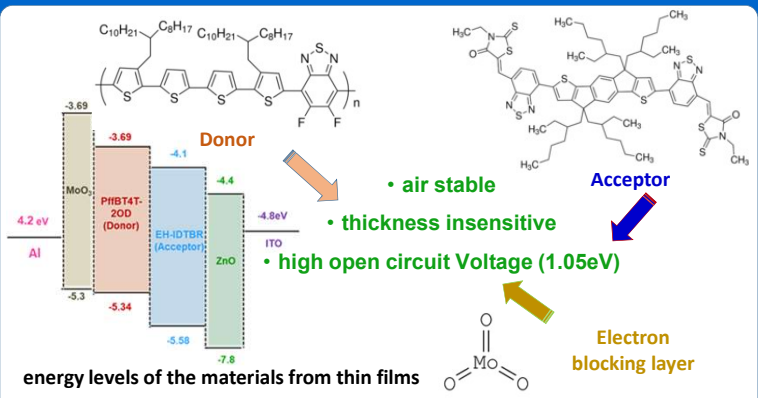


https://www.nature.com/news/

Organic photovoltaics (OPV)

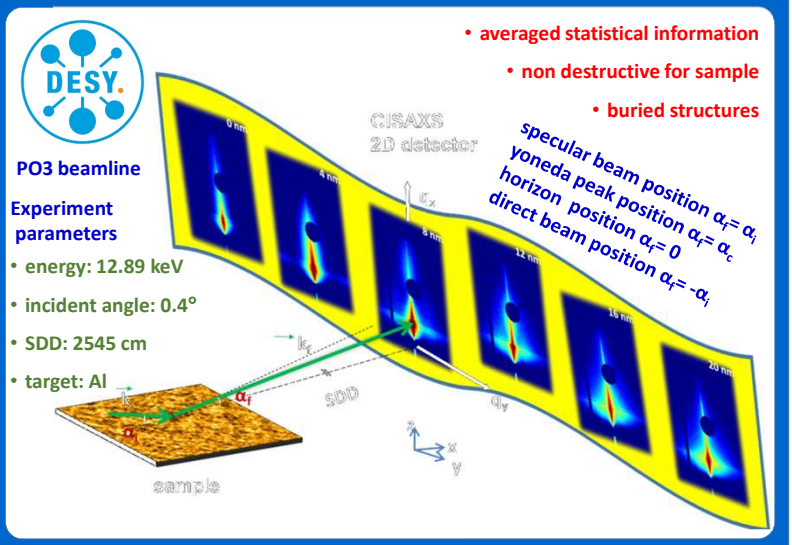
- ✓ light weight and flexible to substrates;
- ✓ semitransparent for window-like applications;
- ✓ low manufacturing costs comparing with inorganic PVs, like silicone based cells
- ✓ low environmental impact;

Materials and blocking layer

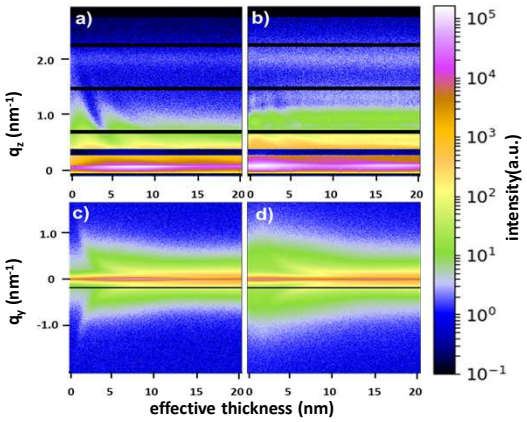


energy levels of the materials from thin films

In-situ sputtering experiment

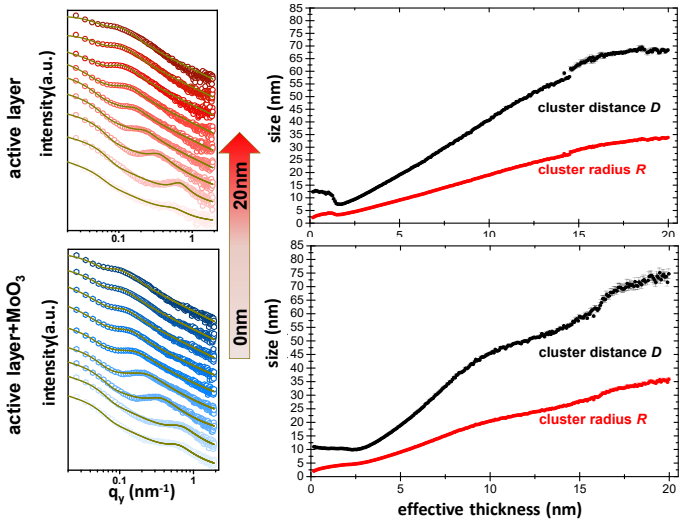


In-situ GISAXS results



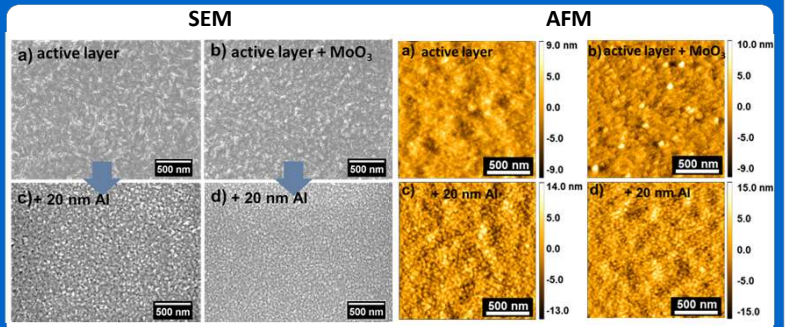
evolution of vertical cuts at q_y=0 without a) and with b) MoO_3 layer versus the effective film thickness δ;

c) and d) show the corresponding evolution of horizontal cuts at Al Yoneda peak range.



horizontal line cuts q_y and the corresponding fits in the range of the Al Yoneda peak without and with MoO_3 layer versus the effective film thickness δ.

Surface morphology before vs after sputtering



active layer a) and with 10 nm MoO_3 on top b); 20 nm AL sputtered on the active layer c)and on active layer with MoO_3 d).

Conclusion

- Appearing of aluminum l peaks move from large to small q_y values with increasing δ, which can be assigned to Al clusters appearing during the sputter process.
- Faster formation of aluminum cluster on pure active layer than on MoO_3 layer.

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