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Printed electrolyte-gated organic field-effect transistors on flexible substrates

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Organic electrolytes-gated field-effect transistors (EGOFETs) **(Figure 1A)** are raising a lot of interest due to their low-cost fabrication using solution-processing methods, lower power consumption, light weight, and compatibility with flexible substrates, among others[1]. In may cases, the preparation of large-area uniform and reproducible films based on small molecule organic semiconductors (OSCs) can be very challenging due to the low viscosity of their solutions. To solve this, an interesting concept is the use of blends of OSCs and insulating binding polymers. This approach typically gives rise to films with an enhanced crystallinity and an improved device performance[2].

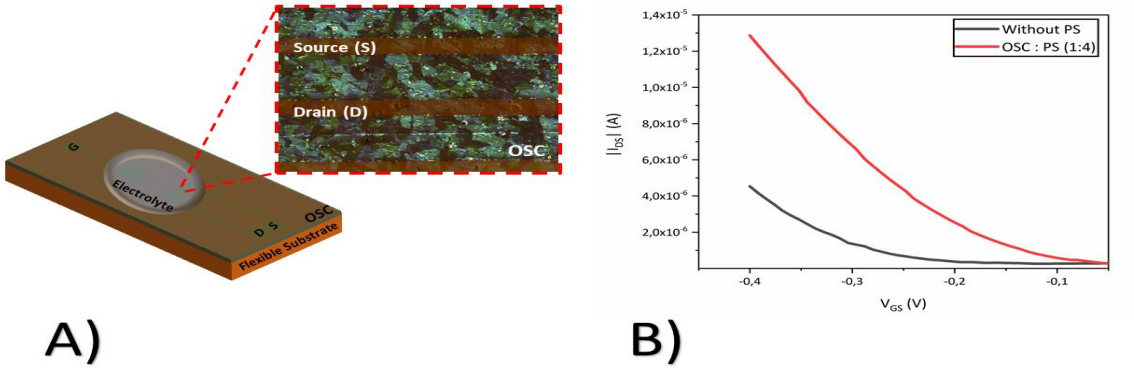

Figure 1. A) EGOFET structure and polarized optical microscopy image of an OSC thin film. B) I–V transfer characteristics of the EGOFET (V_{DS} = - 0.4 V) with and without binding polymer (PS).

Here we demonstrate that the use of these types of blends results in more reliable and reproducible films on Si/SiO_2 substrates that exhibit higher stability and field-effect mobility compared to the devices based on only the OSC material In addition, the optimized formulations have also been employed to fabricate EGOFETs on flexible substrates (Kapton, PEN). The performance of these devices has also been assessed **(Figure 1B).**

References

[1] Wang, G. Y. Electrolyte-Gated Field Effect Transistors in Biological Sensing : A Survey of Electrolytes. 2021, **9**, 939–950.

[2] Riera-Galindo, S.; Leonardi, F.; Pfattner, R.; Mas-Torrent, M. Organic Semiconductor/Polymer Blend Films for Organic Field-Effect Transistors. *Adv. Mater. Technol.* 2019, **4** (9).