Ending up underwater: organic transistors for innovative biosensing platforms

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In recent decades, organic transistors have garnered significant interest from both academic and industrial communities due to their versatility in a wide range of applications, including flexible electronics, driving components for next-generation flat displays, and innovative sensors highly responsive to both physical and chemical stimuli.

More recently, when operated in the so-called electrolyte-gated configuration, organic transistors have also proven to be effective transducers for developing advanced biosensing platforms with selectivity and sensitivity performances beyond the current state-of-the-art. Overall, these devices offer key advantages such as low cost, lightweight design, portability, miniaturization, and low-voltage operation (<1V), aligning perfectly with the "point-of-care testing" paradigm.

Despite their promising potential, however, several scientific and technological issues remain particularly when organic transistors work in direct contact with real biological fluids and their molecular content. In this seminar, I will provide an overview of our recent research activities in this field, highlighting the main advancements and challenges. Special attention will be given to the operation of organic electrochemical transistors (OECTs) when used with biofluids such as human blood and seminal plasma, as well as to their application in detecting biomarkers related to inflammatory conditions and cardiovascular diseases [1-3].

References

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