Screen-printing technology for (bio)sensor manufacture;  
a success story

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Screen-printing technology is a fast and cost-effective process, widely used in organic and printed electronics, and is one of the most promising technologies to produce electrochemical (bio)sensors for biomedical, agri-food and environmental applications\(^1\). The advantages of screen-printed (bio)sensors include sensitivity, selectivity, possibility of mass-production and miniaturization, which facilitates the design of portable and cost effective measuring systems. Moreover, (bio)sensor fabrication through screen-printing technology is very versatile and this versatility is likely to underpin the progressive drive towards miniaturized, sensitive and portable devices, having already started to established its route from “lab-to-market” for a large number of sensors for both centralized and in-field analyses.

This technology consists of depositing successive layers of special inks or pastes onto an insulating substrate. The pastes used are based on a polymeric binder with metallic dispersions or graphite, and can also contain functional materials such as cofactors, stabilizers and mediators\(^2\). More recently metallic (nano) particles\(^3,4,5\), nanowires\(^6\), carbon nanotubes\(^7\) and graphene\(^8\) have also been included either in these pastes or as a later stage on the working electrode\(^9\).

As a consequence, this presentation will introduce the concept of organic and printed electronics, stopping more in detail in the screen-printing manufacturing process, aimed to the fabrication of screen-printed (bio)sensors. Several examples of such devices primarily from IK4-CIDETEC’s project portfolio will be analysed, covering applications in the food, environmental and medical sectors. Attention will be also directed to the use of metallic (nano) particles or clusters in selected examples where these materials are responsible for enhancing the performance of such devices.

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