SelSens

Development of electrochemical sensing platforms for the selective in-situ determination of endocrine disruptor chemicals

Timeline | 10/2022 to 4/2024

ICIQ People | Antoni Llobet Research Group

Overall Budget | 99.989,21 €

ICIQ Budget | 48.555,52 €

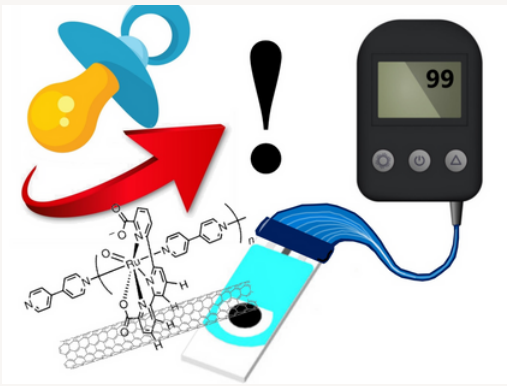
Call | Ajuts d'Indústria del Coneixement - Producte 2021

SUMMARY

Endocrine disruptor chemicals (EDCs) are xenobiotic environmental pollutants that interfere with the endocrine system by mimicking natural hormone as structure analogues. Rendering to their known adverse effects on human health, the European Commission regulates the use of some of them. This is the case of Parabens (PBs) and some Bisphenols (BPs, i.e., bisphenol A), phenolic-type EDCs used, respectively, as preservatives and in the production of plastics. Recently, the number of BPs listed on the ECHA "Substances of very high concern" list has raised from 3 to 34 (ECHA/NR/22/08, April 6, 2022), which will lead to mass analysis of these compounds in commercial products, imported goods and in the environment.

To date, standard methods for the analysis of conventional EDC targets are mainly based on benchtop chromatography instrumentation —which are expensive, time-consuming and require of specialized personnel—, fact that hinders its integration for at-point-of-use devices. Alternative optical methods (e.g., ELISA) show high sensitivity, but are expensive and one-time-use disposables. In this regard, electrochemical techniques open new alternatives to develop easy-to-automate analytical approaches due to the electronic nature of the transduction method. However, the electrochemical screening of trace concentration EDCs is a chemical challenge.

SelSens aims to develop fast, durable, easy-to-use, low-cost mobile (pocket) electrochemical sensors for the analysis of EDCs at levels of sensitivity and selectivity comparable to those of lab instrumentation (e.g., HPLC-MS). To achieve this goal, the partners of UAB (Drs. Sala & Del Valle) and ICIQ (Dr. Llobet) aim to exploit the unique properties of the recently discovered CH-π interactions to anchor oxidation electrocatalysts onto the surface of C-based electrodes (Nat. Chem. 2020, 12, 1060-1066, EU Appl. Pat. No. EP20382665.6). Based on this strategy, a sensitive and reproducible hybrid C-electrode for the determination of Me-PB was developed in a UAB PoC 2020 project (CrineSens). From TRL3, in SelSens we plan to develop a sustainable bottom-up approach to achieve integrated electrochemical sensing platforms on-demand for the selective, low-cost and insitu determination of EDCs at TRL6. We advocate that the synergism of a carbon-based electronics with CH–π-based surface engineering will provide a new family of reusable at-point-of-use sensing platforms capable of selectively screening EDCs in real samples.



CONSORTIA

Coordinator

Universitat Autònoma de Barcelona

Generalitat de Catalunya
Departament de Recerca i Universitats

Reference: 2021 PROD 00026