# Electrochemically exfoliated Graphene/MIP electrode for electrochemical detection of Isoproturon

**Imer Sadriu**[1,2,4]
Jimmy Nicolle[1]
Christine Vautrin-Ul[1]
Fetah Podvorica[2,3,4]

[1]*ICMN Interfaces, Confinement, Matériaux et Nanostructures, UMR7374 – Université d'Orléans, France*
[2]*Chemistry Department of Natural Sciences and Mathematics Faculty, University of Prishtina, rr. "Nëna Tereze" nr. 5, 10000 Prishtina, Republic of Kosovo*
[3]*Academy of Sciences and Arts of Kosova, Rr. "Agim Ramadani" nr 305, 10000 Prishtina, Republic of Kosovo*
[4]*NanoAlb-Unit of Albanian Nanoscience and Nanotechnology, 1000 Tirana, Albania*
imersadriu01@gmail.com; imer.sadriu@cnrs-orleans.fr;

In this study, an original method for elaboration of 100% graphene electrodes has been developed. This consists firstly in electrochemical exfoliation of graphene at negative potentials in a single step and then in preparing electrodes by temperature compression of graphene on a polystyrene substrate. After testing different design methods for graphene electrodes, their electrochemical properties were evaluated using redox probes. XPS, Raman, IR methods and four-point probe conductivity measurements are used to finely characterize the surface chemistry and nanostructure of graphene electrodes and correlate them with their properties.
In a second part, the electropolymerization of ISO-MIPPy films has been successfully carried out onto graphene and their potential for the determination of isoproturon in water has been demonstrated. The electrochemical preparation procedure includes two small steps: electropolymerization performed by cyclic voltammetry and chronoamperometry where ISO template molecules were successfully trapped in the PPy film where they created artificial recognition cavities. After the electrochemical extraction of the template, the PPy film acted as a molecularly imprinted polymer (MIP) for the selective recognition of isoproturon whereas the non-imprinted polymer (NIP) film, made in the same conditions except for the presence of isoproturon, did not exhibit any interaction. ISO-MIPPy films made on graphene electrodes were found to selectively detect isoproturon. Its limit of detection (LOD) in milli Q water, achieved via square wave voltammetry was as low as 13.6 µg $L^{-1}$.

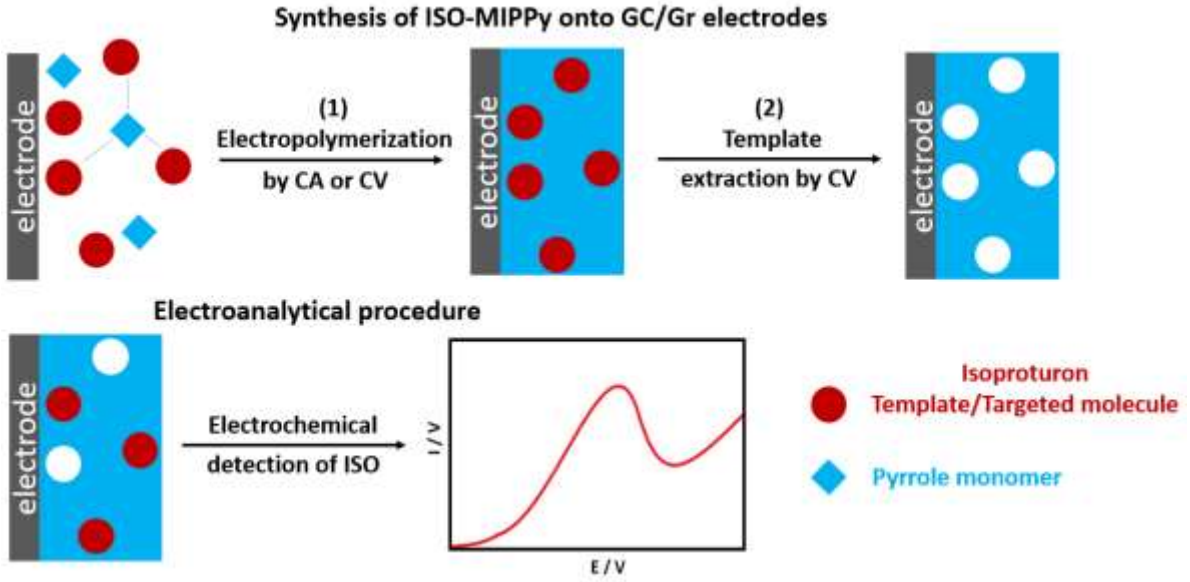


**Figure 1:** Schematic representation of the procedure used for the preparation of ISO-MIPPy films onto exfoliated graphene electrodes, including two steps: 1) electropolymerization of MIPs by CA and/or CV, and 2) the CV extraction of ISO molecules.