# BorderSens successfully tested at end-users' sites

**Outstanding sensitivity achieved in most of the cases**

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The ultimate research aim of BorderSens is to develop a portable, wireless prototype device with the capability to quickly test for different types of illicit drugs, precursors and adulterants/cutting agents, with outstanding accuracy and reduced false positives and false negatives. To do so, BorderSens device will integrate electrochemical fingerprinting technologies, selective Nano Molecularly Imprinted Polymers (nanoMIPs), nanostructured sensors and advanced data analysis with customized algorithms.

Recently, a comprehensive analysis has been carried out to validate the reliability of the electrochemical technology on which BorderSens is based using real samples and comparing it with other existing drug detection methods. In particular, 50 samples consisting of cocaine, heroin, amphetamine, MDMA, methamphetamine and ketamine with different concentrations compositions of cutting agents/adulterants were analysed using electrochemical fingerprinting technologies, colour tests and portable spectroscopic techniques (IR and Raman) and compared to laboratory standard methods. Furthermore, these samples were selected with as much as different matrices available (powders, crystals, pills, liquids…) to test the reliability of the electrochemical approach.

In this particular test, the sensitivity -true positives/(true positives+false negatives)- was the most relevant parameter to compare the different detection methods as no true negative were tested. The electrochemical sensor, the colour test and the IR device exhibited a sensitivity of 90% and higher, which is outstanding for an on-site technique. In contrast, Raman showed a much lower performance (in fact, heroin samples, which consisted of darker coloured powder, could not be analyzed because they were burnt by the Raman laser).

Still, the electrochemical device and colour test offer a better portability than the IR which might be more interesting for its use in the field. Importantly, the electrochemical device aims to overcome the colour test performance by offering a more user-friendly and specific tool, since colour tests usually offers a subjective judgement depending on the operator, which increases the complexity of handling and interpretation.

More tests are planned to be held in the near future in order to provide more reliable data.

Also, nanoMIPs-modified screen-printed electrodes have been tested for the analysis of cocaine in saliva and urine with excellent results at a forensic laboratory.

BorderSens consortium currently comprises 16 partners (universities, border authorities, police services in ports and airports, public organisations, and companies) from 8 EU member states, coordinated by the University of Antwerp. A new LEA (Law Enforcement Body).

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