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Abstract

Highly Selective Electrochemical Profiling of Heroin in Street Samples †

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Trafficking and consumption of drugs of abuse are a global concern that threatens social structures and jeopardizes the security of nations [1]. Particularly, heroin use still accounts for the largest share of drug-related harms [2]. Thus, effective, rapid, low-cost and selective analytical methods are vital to hinder drug trafficking, and prevent its availability in the drug market [3]. This way, chemical color tests and sophisticated spectroscopic instrumentation are often the first choice. However, significant drawbacks should be considered e.g., the inaccuracy of the color tests or the high cost and low portability of the spectroscopic devices. Interestingly, electrochemical sensors proved to be the solution for the on-site detection of illicit drugs due to their balance between affordability and analytical performance [4,5].

The present study reports on an improved method for the on-site profiling of heroin. The principle is based on two-peak recognition i.e., from heroin and its main metabolite 6-monoacetylmorphine (6-MAM) at basic pH (Figure 1). Unfortunately, paracetamol, which is the most used cutting agent in heroin seizures, overlaps completely 6-MAM peak at unmodified electrodes, hindering its potential use to selective detect heroin. As a result, a rapid and smart electrochemical pretreatment is presented to overcome this masking phenomena. Besides, a customized script is integrated to enhance peak-to-peak separation and enlighten the full composition of heroin samples.

Overall, the proposed strategy paves the way to a rapid, user-friendly and low-cost on-site detection of heroin in real scenarios by law enforcement officers: (i) analysis of suspicious powders in the street; and (ii) rapid screening of cargos in border settings (e.g., airports, harbors).

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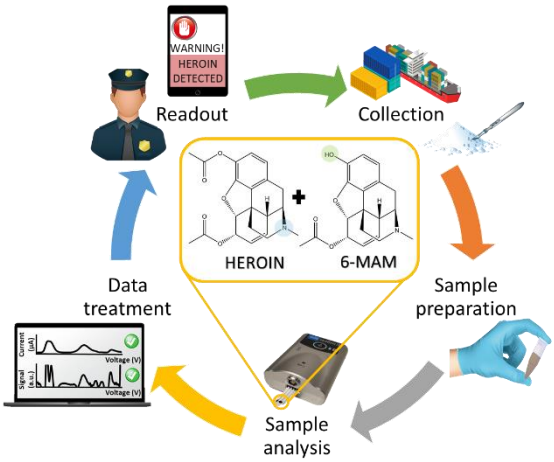

Figure 1. Schematics of the concept for the on-site screening of heroin.

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