Fast on-site detection of Ochratoxin A by the graphene-based field-effect transistors

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Mycotoxins are a widespread contaminant in food and feed produced as second metabolites of *Asperagillus* and *Penicillium genera* microfungi [1,2]. Ochratoxin A is a mycotoxin that can be found in a wide range of food, from cereals to wine, which is why it has to be regularly monitored by different standardized methods. To date, methods like high-performance liquid chromatography-mass spectrometry or enzyme-linked immunosorbent assay (ELISA) are very prominent tools for Ochratoxin A monitoring, but they require highly trained and qualified staff, as well as controlled laboratory environment, which hinders the in-field use and do not promote low-cost and easy-to-use current and future demands [3,4]. In this research, we report on a specific biosensing tool for the detection of Ochratoxin A, based on lithography-fabricated array of graphene field-effect transistors (G-FETs) on a single silicon chip. G-FETs are assembled with specific aptamers, used as a recognition element on the graphene channel as a transducer deposited via pyrene-based linker (Figure 1). The biosensor showed high sensitivity to Ochratoxin A with the limit of detection of 1.4 pM and a response time of the order of magnitude 10 s. The biosensor is tested on a real red wine samples with a response time of 50 s, showing promising results for future research.

References:

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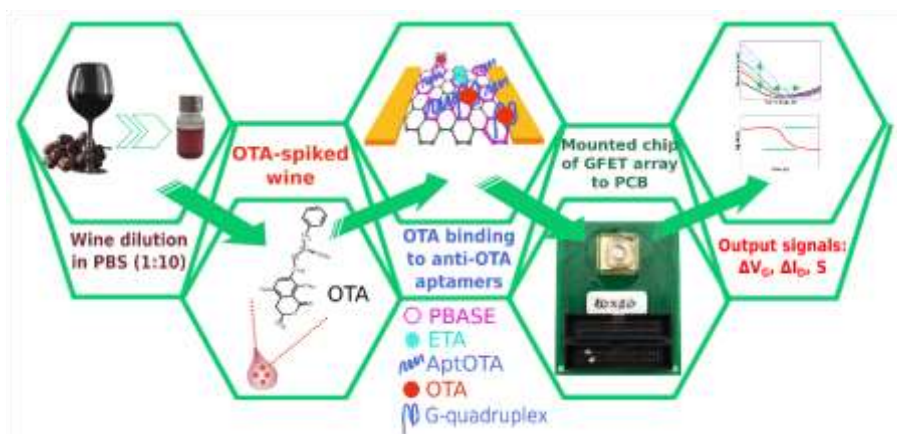
Figures:

Figure 1: A schematics of G-FET-based biosensor development for Ochratoxin A detection