

Supplementary Information

Supplementary Table 1 summarizes the label-free techniques for detecting atrazine. The primary label free methodology has been impedimetric/electrochemical impedance spectroscopy based detection.

Supplementary Table 1:

Reference Article #	Technique	Linear range	Limit of Detection	Platform realization time
1	DPV	0.05–0.5 ng/mL	0.016 ng/mL	> 19 h
2	DPV	0.04–0.6 ng/mL	0.018 ng/mL	> 2 h
3	SPR	0.5–15 ng/mL	0.7134 ng/mL	9 h
4	Conductometric	0.1–100 ng/mL	0.07 ng/mL	> 3 h
5	Impedimetric	0.5–30 ng/mL	0.5 ng/mL/0.1 ng/mL	> 16 h
6	DPV	0.05–1.5 ng/mL	0.011 ng/mL	1 h
This work	EIS	1 fg/mL to 10 ng/mL	1 fg/mL	5 minutes

DPV-Differential pulse voltammetry, SPR- surface plasmon resonance, EIS- Electrochemical impedance spectroscopy

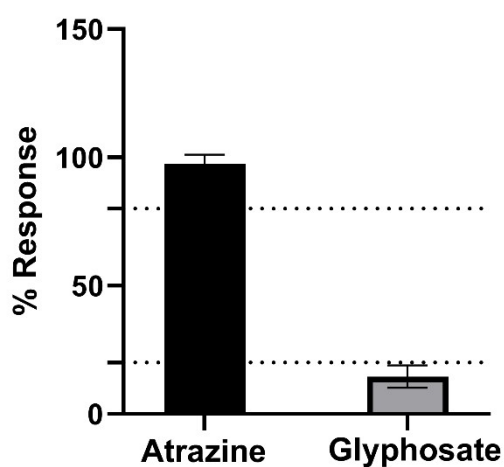


Fig. S1: presents the results of the specificity study, highlighting the sensor's response to Atrazine compared to a Glyphosate.

Reference:

- 1 X. Liu, W.-J. Li, L. Li, Y. Yang, L.-G. Mao and Z. Peng, A label-free electrochemical immunosensor based on gold nanoparticles for direct detection of atrazine, *Sens Actuators B Chem*, 2014, 191, 408–414.
- 2 M. Yang, X. Zhao, S. Zheng, X. Liu, B. Jin, H. Li and Y. Gan, A new electrochemical platform for ultrasensitive detection of atrazine based on modified self-ordered Nb₂O₅ nanotube arrays, *Journal of Electroanalytical Chemistry*, 2017, 791, 17–22.
- 3 E. Yılmaz, E. Özgür, N. Bereli, D. Türkmen and A. Denizli, Plastic antibody based surface plasmon resonance nanosensors for selective atrazine detection, *Materials Science and Engineering: C*, 2017, 73, 603–610.
- 4 J. Bhardwaj, S. Devarakonda, S. Kumar and J. Jang, Development of a paper-based electrochemical immunosensor using an antibody-single walled carbon nanotubes bio-conjugate modified electrode for label-free detection of foodborne pathogens, *Sens Actuators B Chem*, 2017, 253, 115–123.
- 5 M. Marrakchi, S. Helali, J. S. Camino, M. A. González-Martínez, A. Abdelghani and M. Hamdi, Improvement of a pesticide immunosensor performance using site-directed antibody immobilisation and carbon nanotubes, *Int J Nanotechnol*, 2013, 10, 496–507.
- 6 R. Zumpano, M. Manghisi, F. Polli, C. D'Agostino, F. Ietto, G. Favero and F. Mazzei, Label-free magnetic nanoparticles-based electrochemical immunosensor for atrazine detection, *Anal Bioanal Chem*, 2022, 414, 2055–2064.