

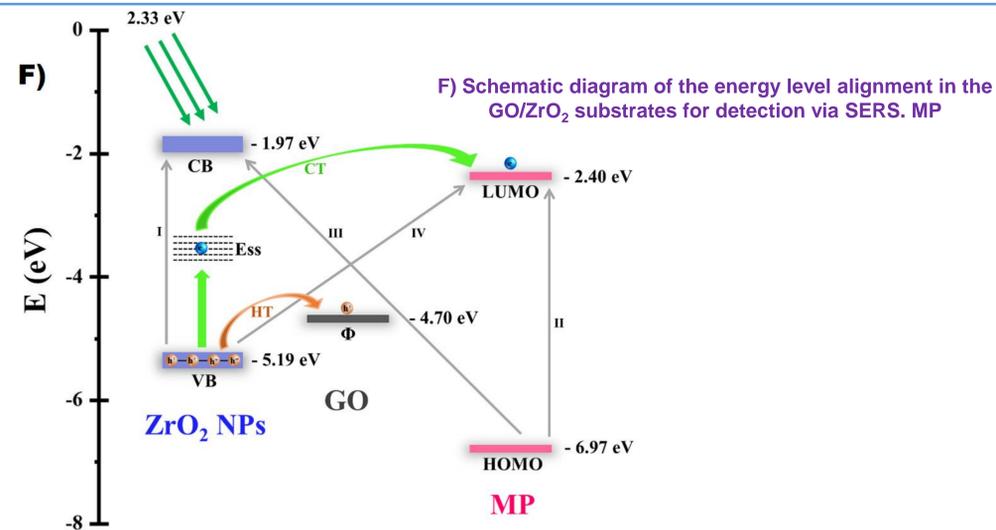
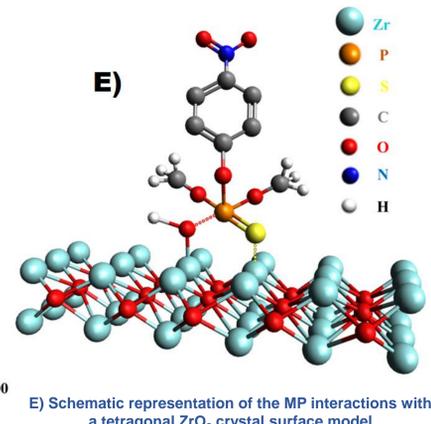
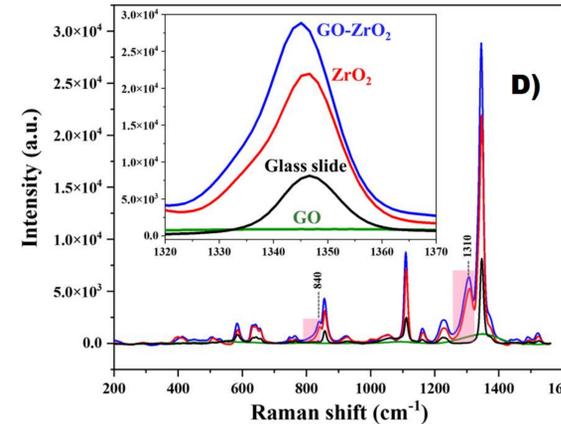
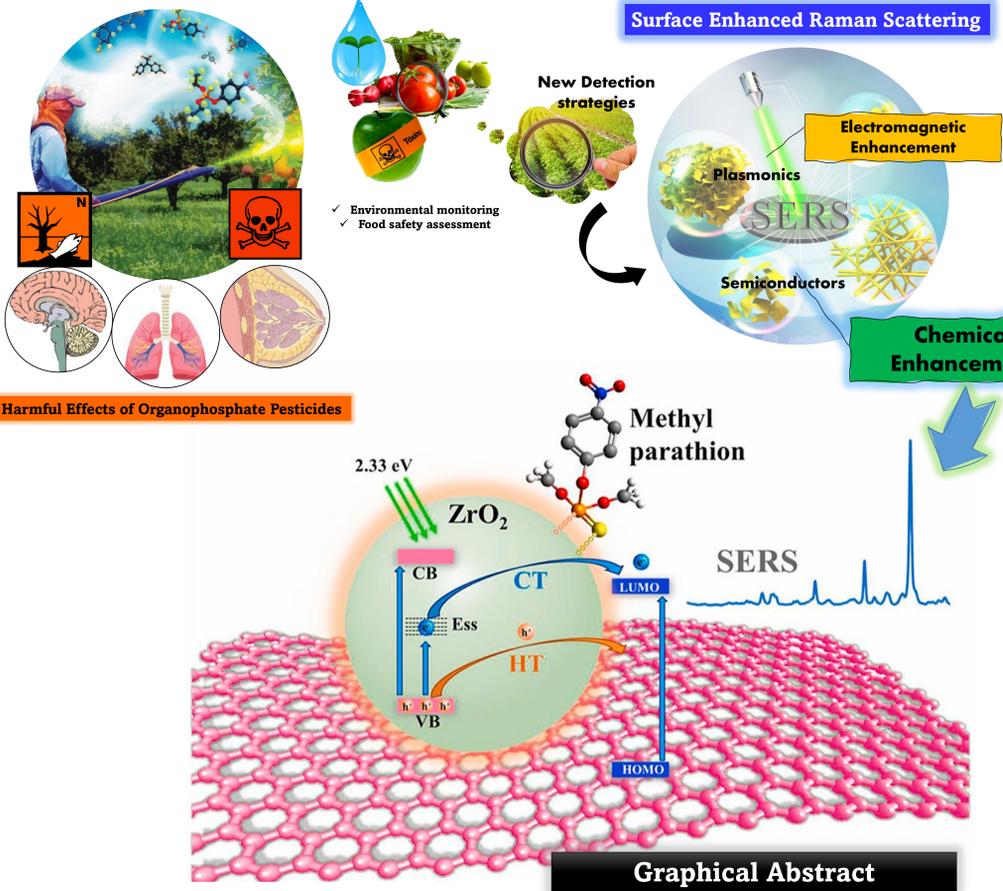
"Improved charge-transfer resonance in graphene oxide/ZrO₂ substrates for plasmonic-free SERS determination of methyl parathion in complex samples matrix"

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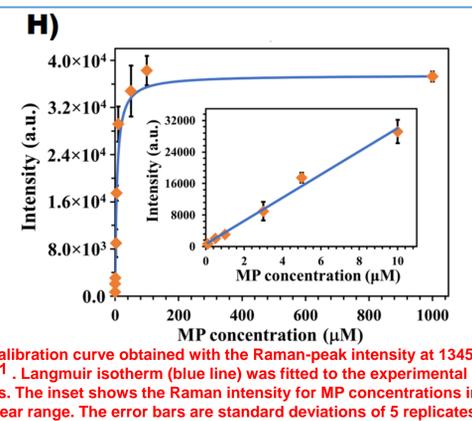
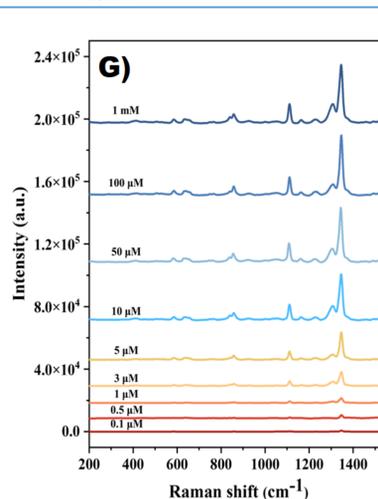
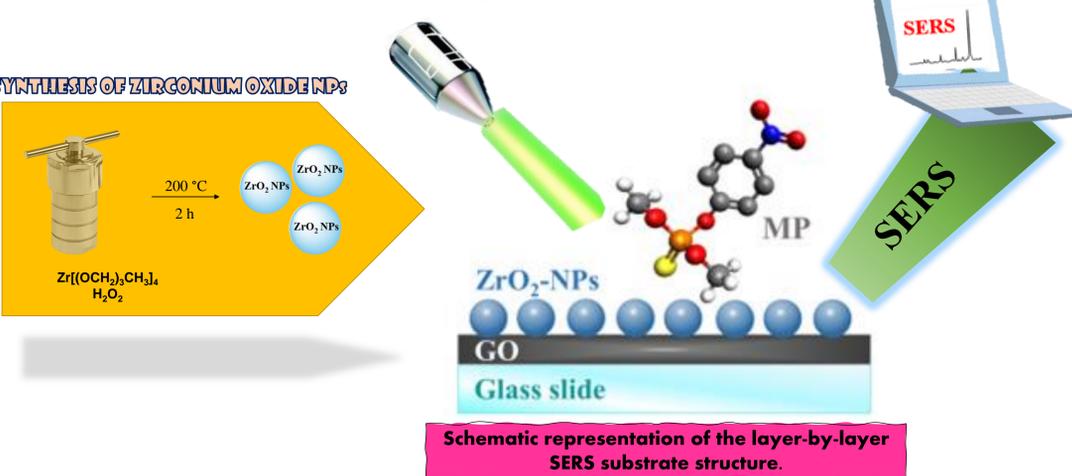
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INTRODUCTION

RESULTS



EXPERIMENTAL



CHARACTERIZATION

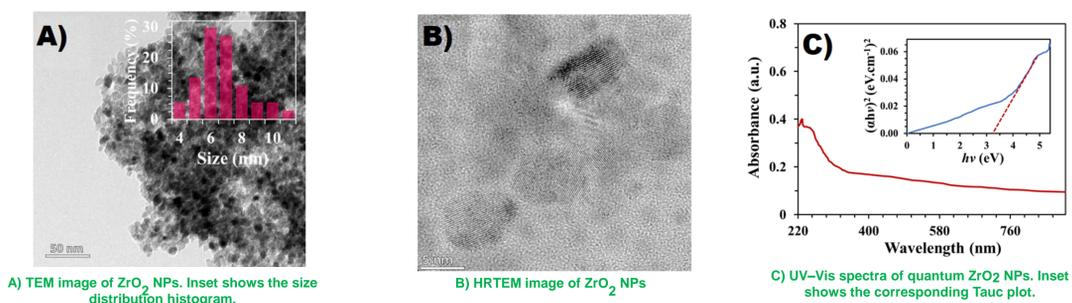
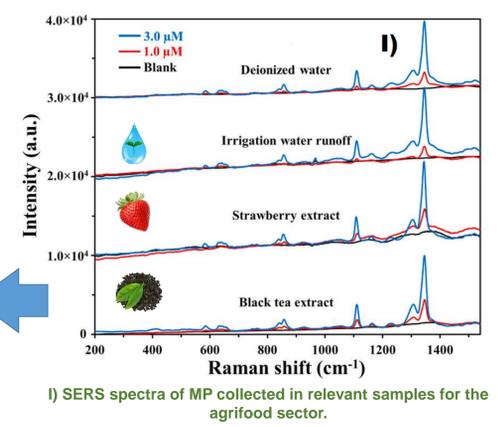


Table 1. Accuracy study for the determination of MP spiked in relevant samples.

Sample	Added MP (μM)	Found MP (μM)	Recovery (%)
Irrigation water runoff	1.0	1.02 ± 0.02	102.1 ± 2.3
	3.0	2.92 ± 0.17	97.4 ± 5.6
Strawberry extract	1.0	1.02 ± 0.06	102.1 ± 5.6
	3.0	2.94 ± 0.26	98.2 ± 8.7
Black tea extract	1.0	0.99 ± 0.02	99.7 ± 1.8
	3.0	3.04 ± 0.24	101.6 ± 7.9



CONCLUSIONS

A novel SERS substrate was prepared by a layer-by-layer method with graphene oxide (GO) and quantum-sized ZrO₂ NPs and thus implemented for quantification of the organophosphate pesticide methyl parathion (MP) in irrigation water runoffs, strawberry and black tea extracts. A detection limit of 0.12 μM was achieved with an outstanding repeatability (variation ≤4.5%), and recovery percentages between 97.4 and 102.1%. The resulted sensitivity is enough to determine the maximal MP concentration permissible in drinking water according to international regulations. The reported platform offers a fast and sensitive detection of MP for food quality assessment and environmental monitoring.

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