



# Simultaneous removal of Microplastics and Chlorpyrifos from water with magnetic powder



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## Introduction/Background

- Microplastics and chlorpyrifos are pervasive pollutants that pose severe threats to both aquatic ecosystems and human health<sup>1</sup>.
- Microplastics, due to their small size, can be ingested by marine organisms, leading to bioaccumulation, and potentially entering the human food chain<sup>2,3</sup>.
- Chlorpyrifos, a widely used pesticide, poses neurotoxic risks, particularly affecting children's neurodevelopment<sup>4</sup>.

## Goals and Objective

- Can patented magnetic powder (2D C@Fe-MOF) remove both microplastics and pesticides.

## Methodology

- Conducted adsorption experiments utilizing patented magnetic powder to remove simultaneously Carboxylic Modified Polystyrene MPs (50mg/L to 250mg/L) and chlorpyrifos (25mg/L to 100mg/L) within 1 hr.
- Analyzed adsorption efficiency and removal rates using DLS, UV-Vis spectroscopy, and GC-MS.

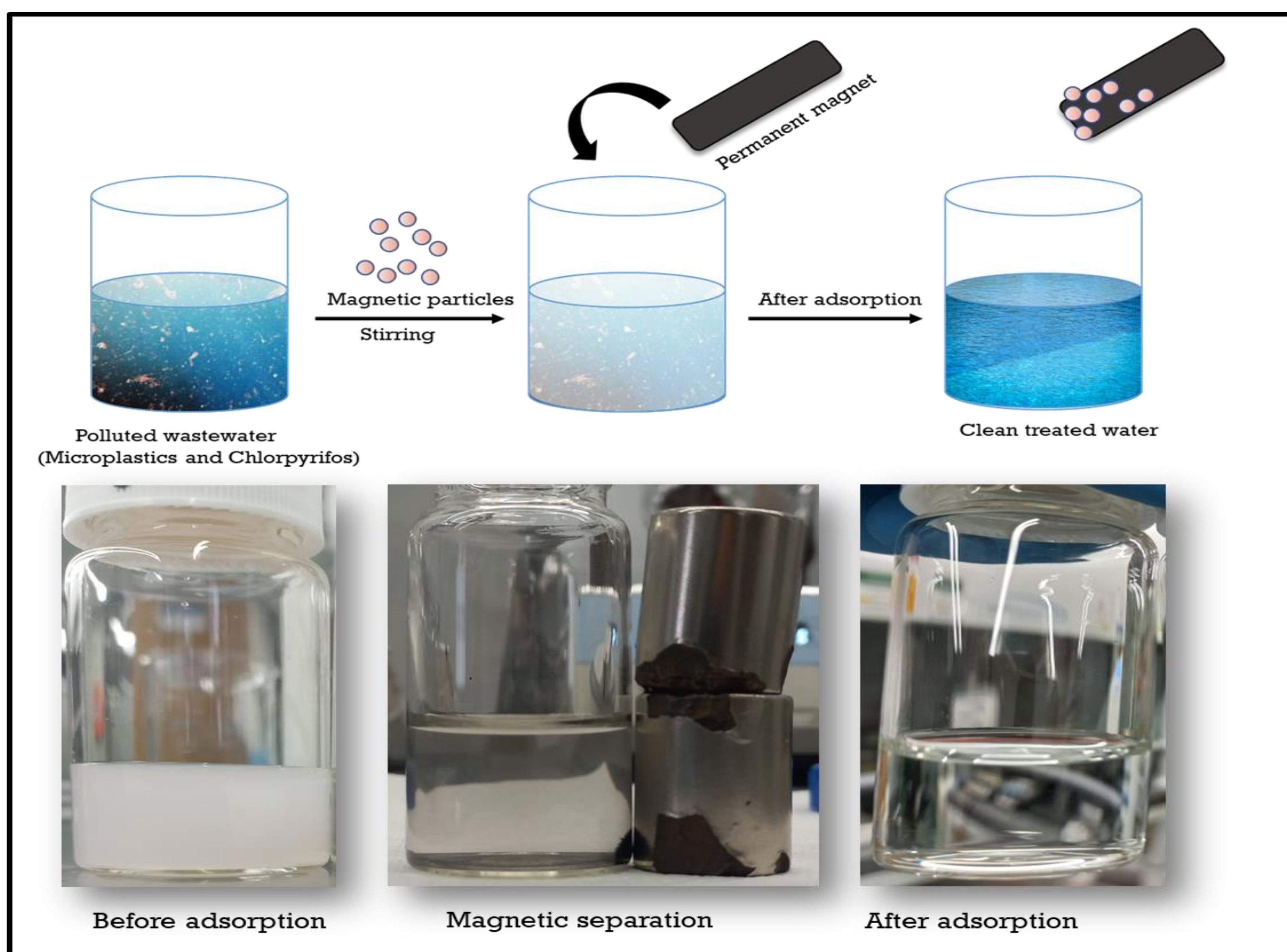


Fig.1 Adsorption mechanism of microplastics and chlorpyrifos on magnetic powder

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## Results and Discussion

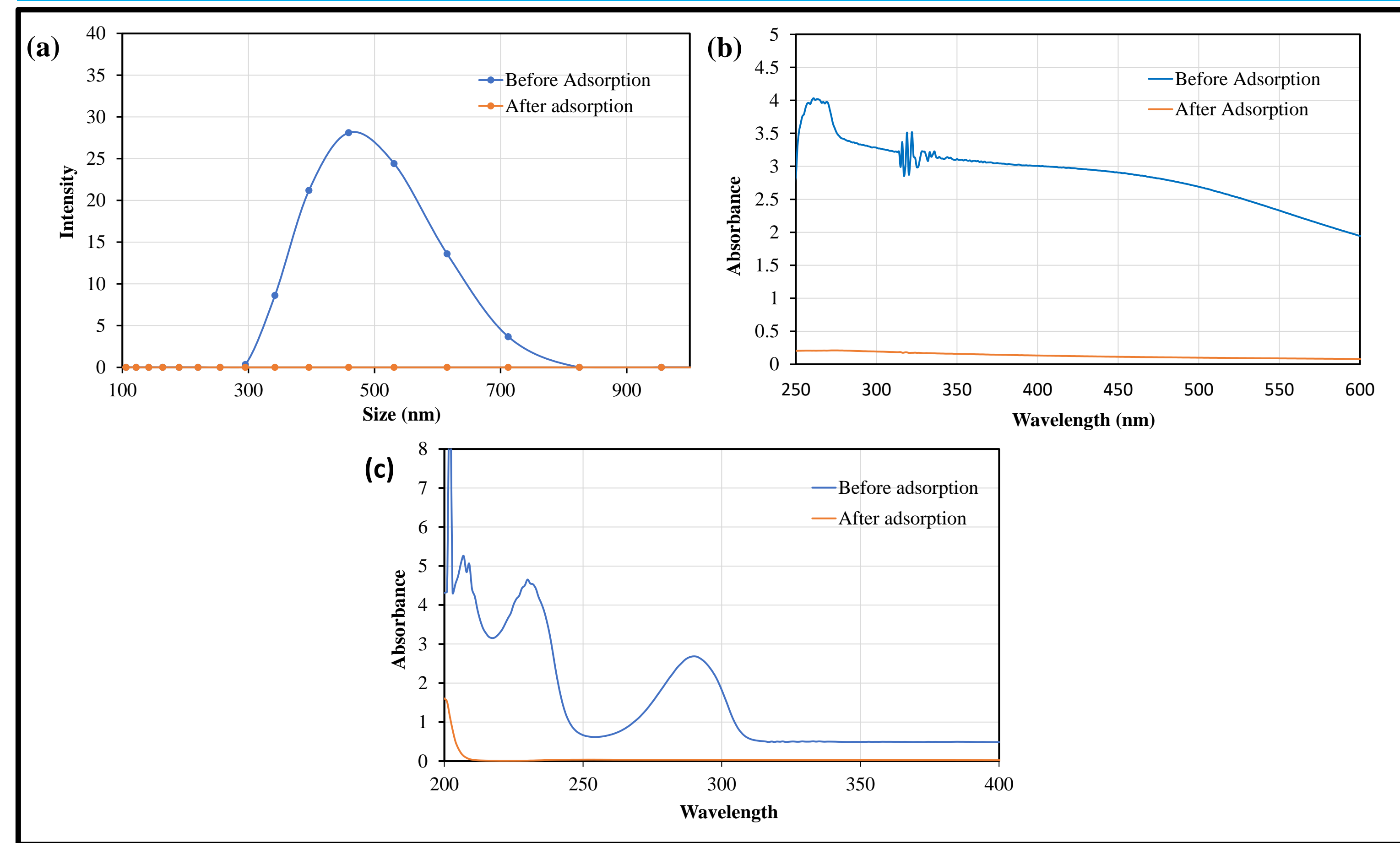


Fig.2 DLS and UV-Vis analysis of carboxylic modified microplastics and chlorpyrifos removal (a)-(b) MPs: 50mg/L, (c) CPS: 50mg/L,

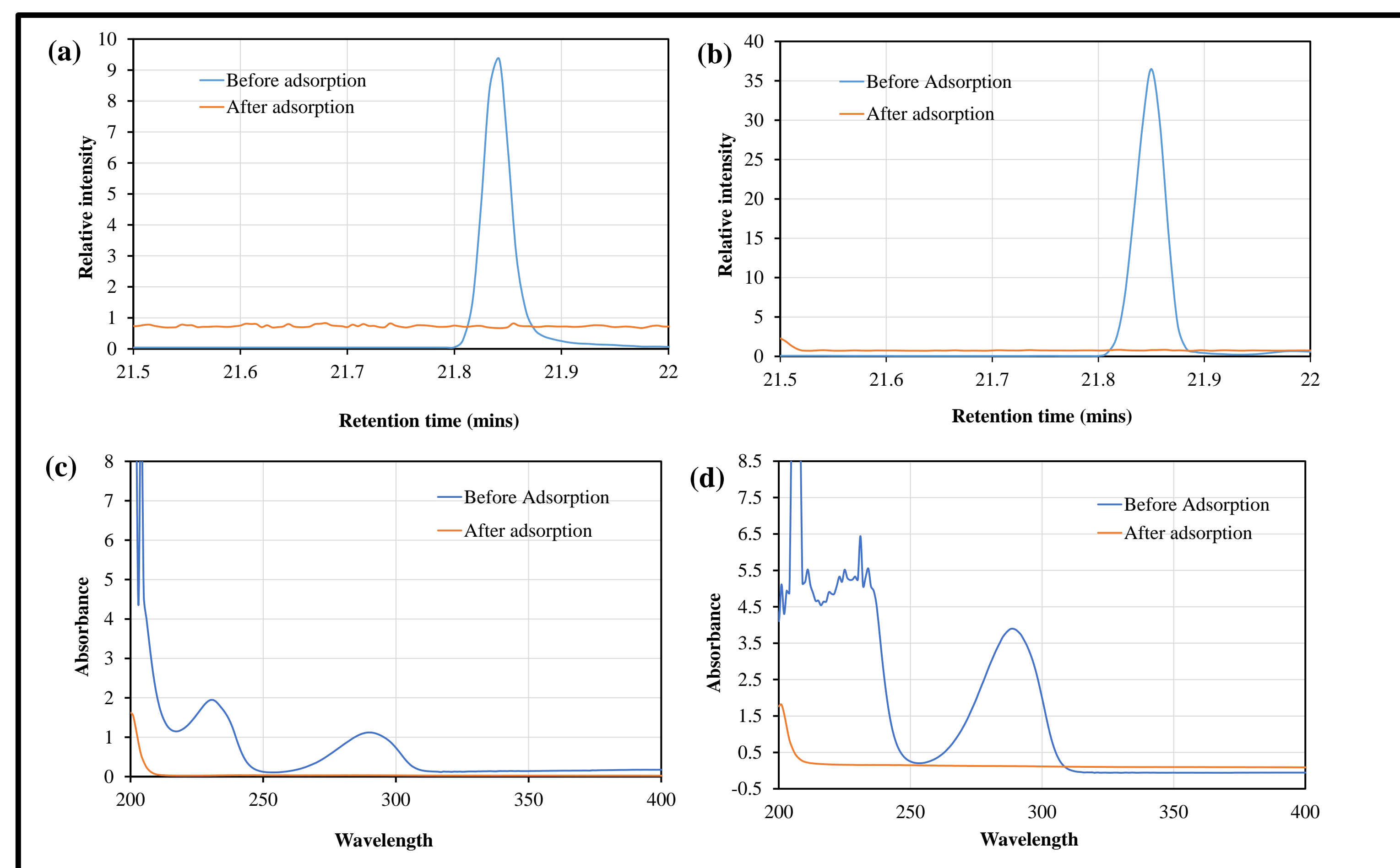


Fig.3 GC-MS and UV-Vis analysis of chlorpyrifos before and after adsorption (a)-(c) 25 mg/L and (b)-(d) 100 mg/L

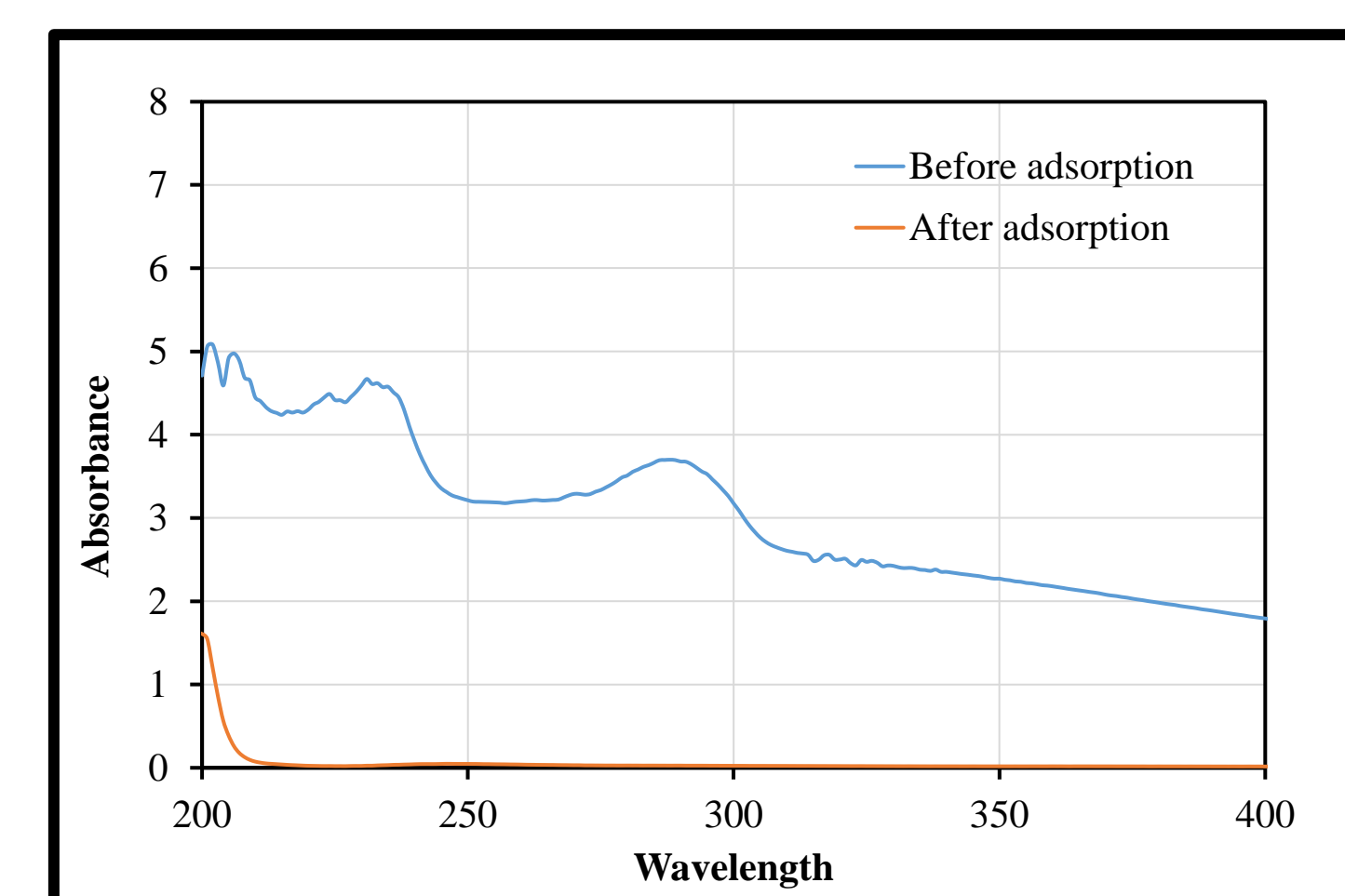


Fig. 4 UV-Vis analysis of simultaneous removal of both CB-PS microplastics and chlorpyrifos, MPs: 250 mg/L, CPS: 100 mg/L,

## Conclusion

- Chlorpyrifos upto 100 mg/L in presence of microplastic upto 250 mg/L was removed 100% within 1 hr utilizing patented magnetic powder.

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