

# Magnetic MOF-based adsorbent for effective removal of microplastics

Presenter:  
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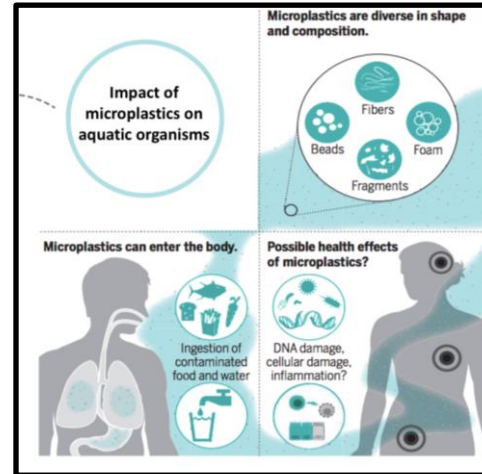


# Acknowledgment

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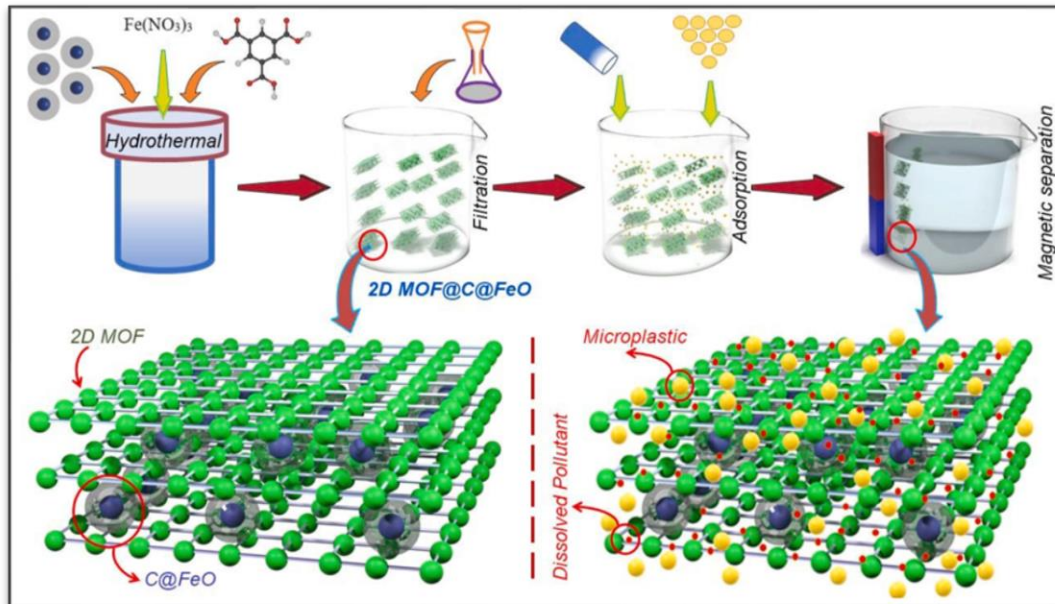
- Dr Nasir Mahmood, School of Science, RMIT
- Dr Muhammad Haris, Postdoctoral fellow, RMIT
- Karishma Jain, Joint PhD student ACSIR-RMIT
- Mohammad Aslam, PhD student, RMIT
- Sustainable Technologies and systems EIP/ Capability Development Fund
- RMIT Scholarship for Muhammad Haris, Karishma Jain, and Mohammad Aslam,

# Motivation for the work and engineered adsorbent for removing MPs



Proof of Concept:

Illustration of Development of Hybrid material (Haris et al. Chem. Eng.J., 455 (2023) 140390 )



- 330 news items over the world in UK, China, Spain, US, Argentina, Finland, France, Vietnam, Pakistan
- Featured in [ABC News Breakfast TV](#), The World Today radio program, ABC Melbourne Breakfast radio, [ABC news online](#), Herald Sun, Channel 7
- 92 million people accessed

# Lab demonstration of MPs removal

on: Trusted

## Adsorbent development:

Reengineered production of adsorbent

- via a simpler process to be cheaper at higher quantity
- to be suitable for salty environment and pure water
- to adsorb both negatively and positively charged MPs.
- To adsorb both low and high concentration of MPs at different sizes (30nm-1000nm) within 15-60min

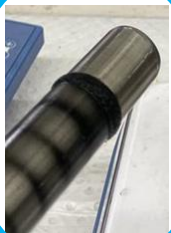
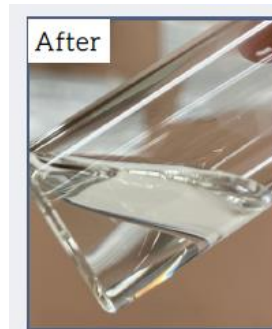
## Lab demonstration:

- Utilising commercial Magnetic separator
- Reconfirming proof of concept stage results
- Practically no Iron leaching (120 PPB << allowable EPA Fe limit of 300 ppb)

MPs Solution & adsorbent

Pump

Magnetic Separator

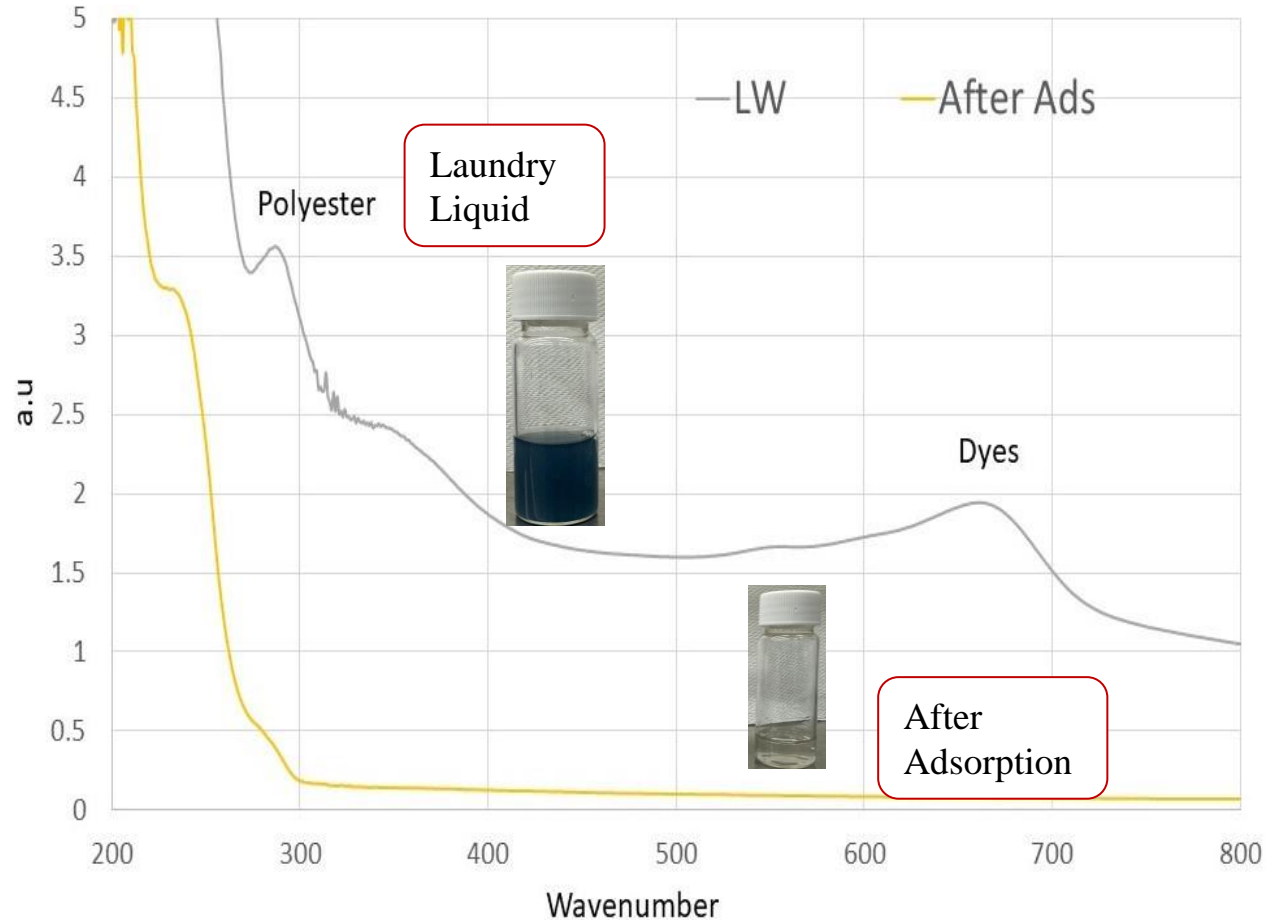


Inside Magnetic Separator

# Utilising 2<sup>nd</sup> Gen of nanopillared structure to remove MPs and Dye from actual laundry liquid of textile industry, Microplastics and Chlorpyrifos (pesticides)

- 100% removal of dyes
- 88% removal of dyes

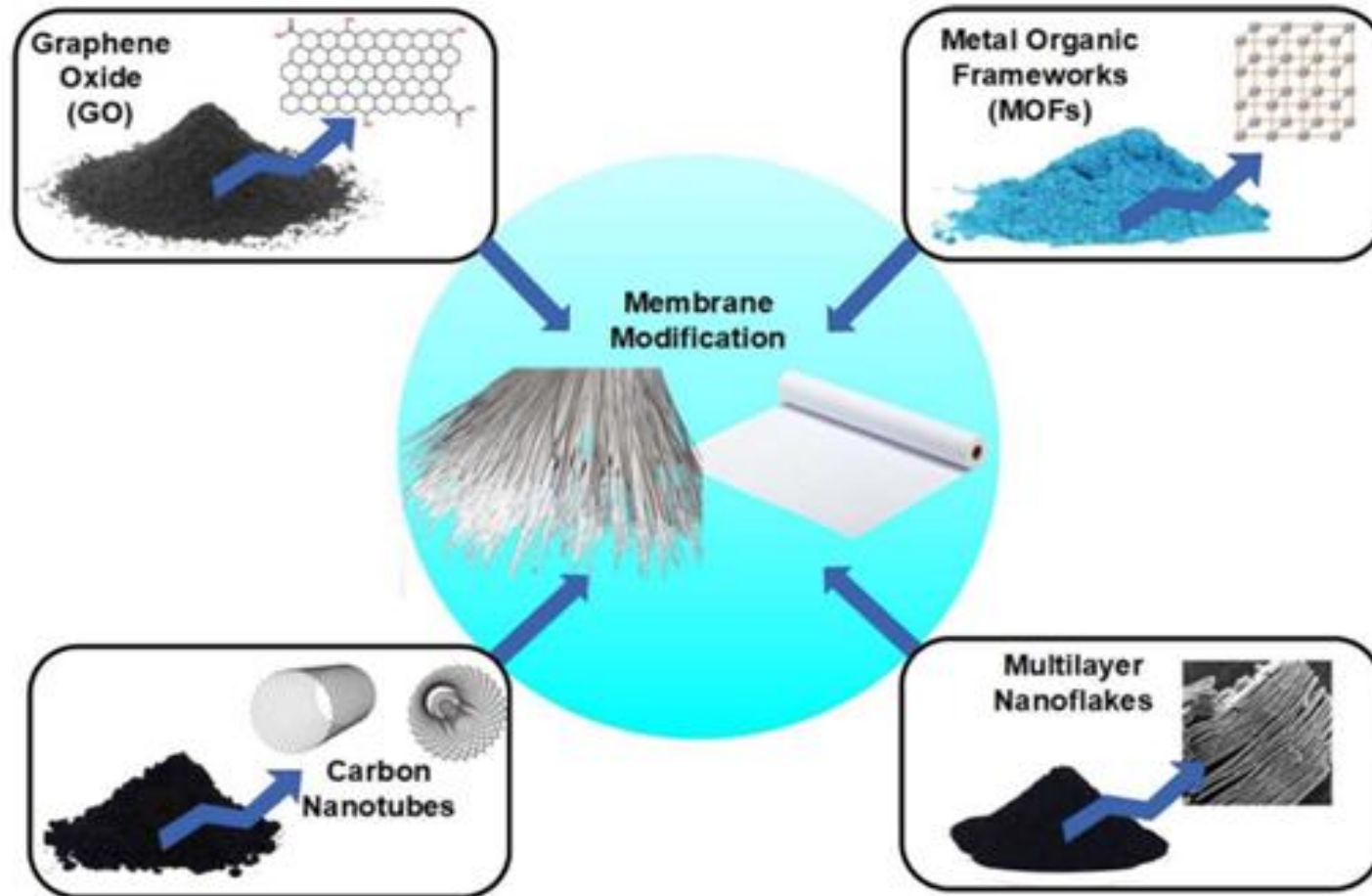
- Chlorpyrifos up to 100 mg/L in presence of microplastic up to 250 mg/L was removed 100% within 1 hr



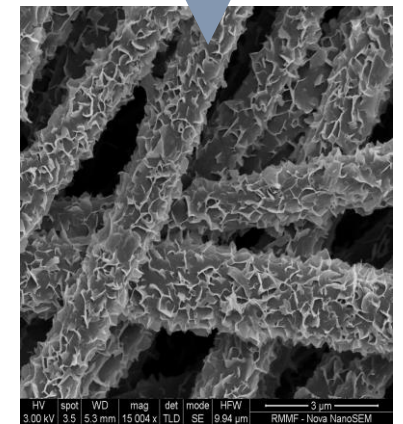
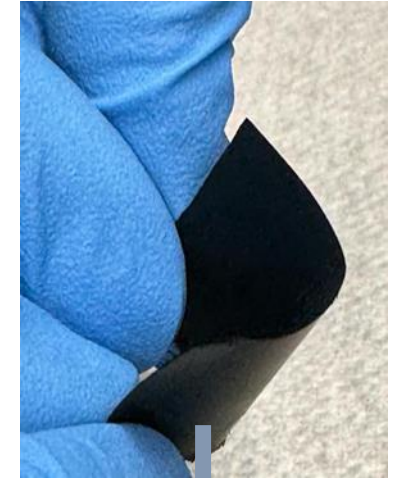
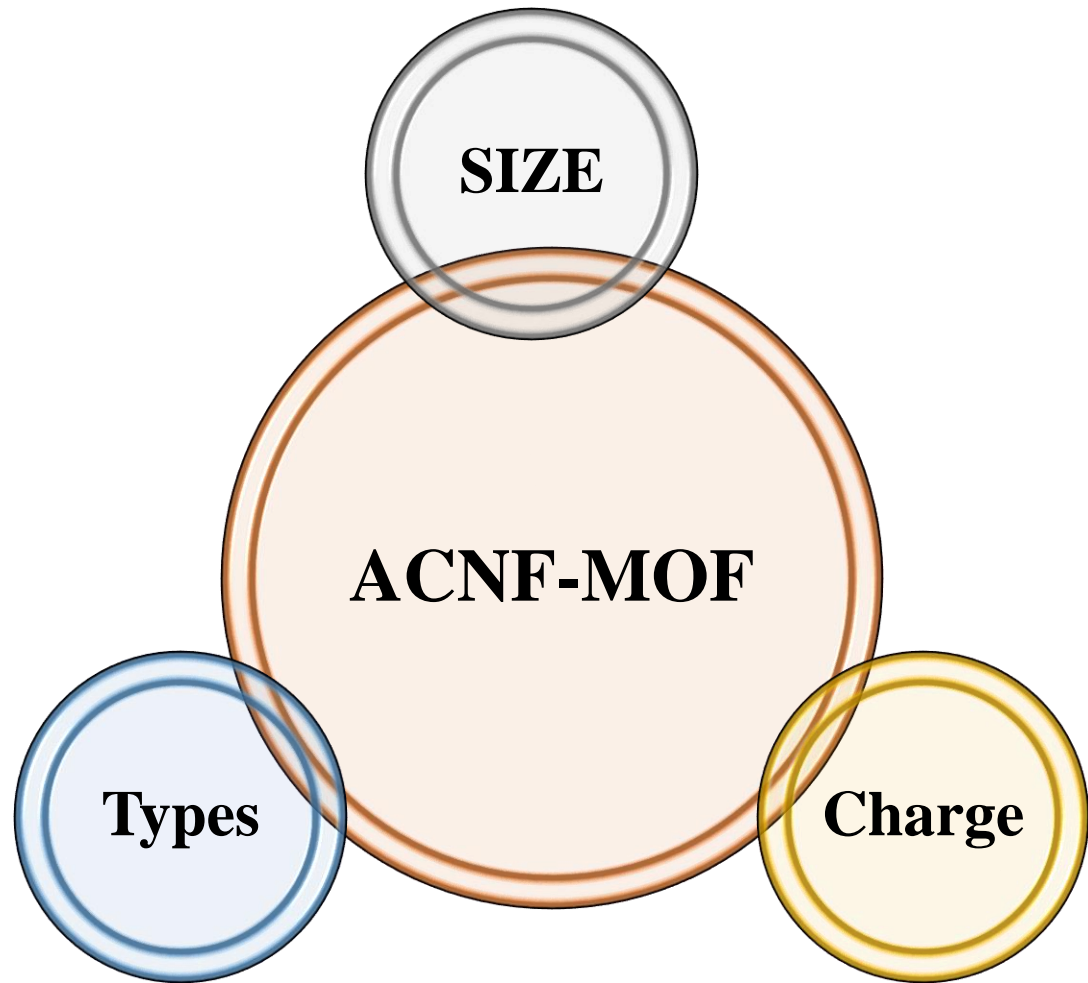
- Poster #10, Muhammad Haris
- Poster #18- Mohammad Aslam



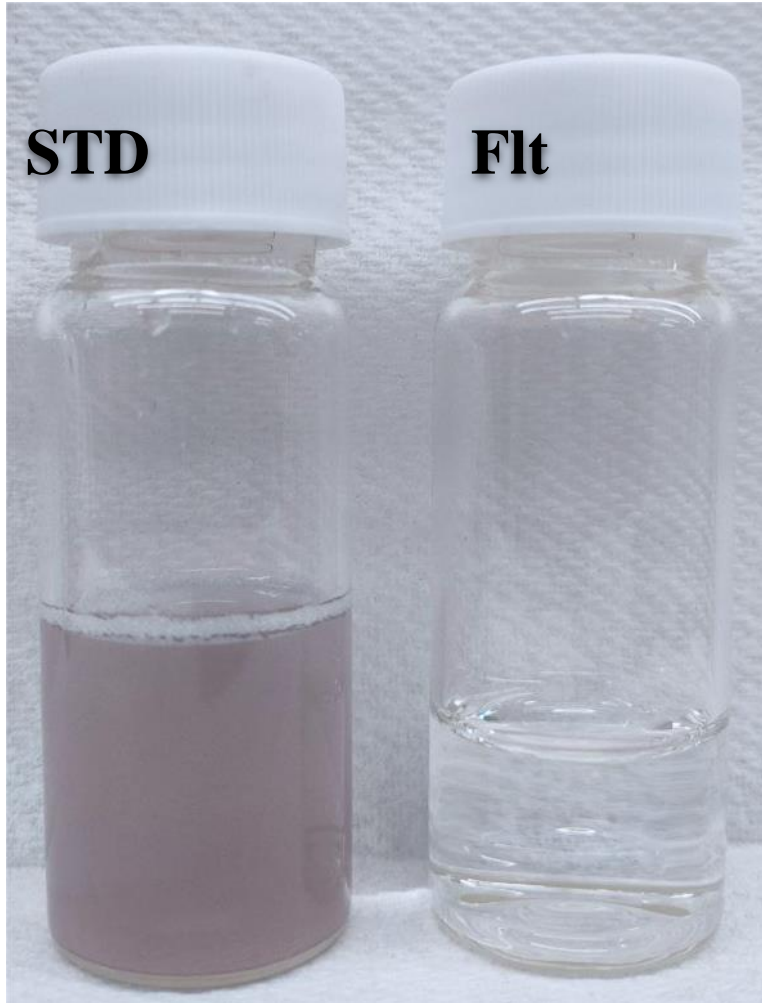
# Emerging materials for the synthesis of membranes used for NPs removal



# Microplastic Removal using membrane



## Mix Pollutant-Congo Red Dye, Cu metal, Ibuprofen, PVDF (Polyvinylidene fluoride)



### Poster #15, , Karishma Jain

- 100% removal of MPs (Ps>500nm, PVDF, HDPE, PET)
- Reusable up to 50 times
- 100% simultaneous removal of PVDF and other pollutants (Cu, dye, Ibuprofen)
- Repurposed membrane at the end of life for energy storage





THANK YOU