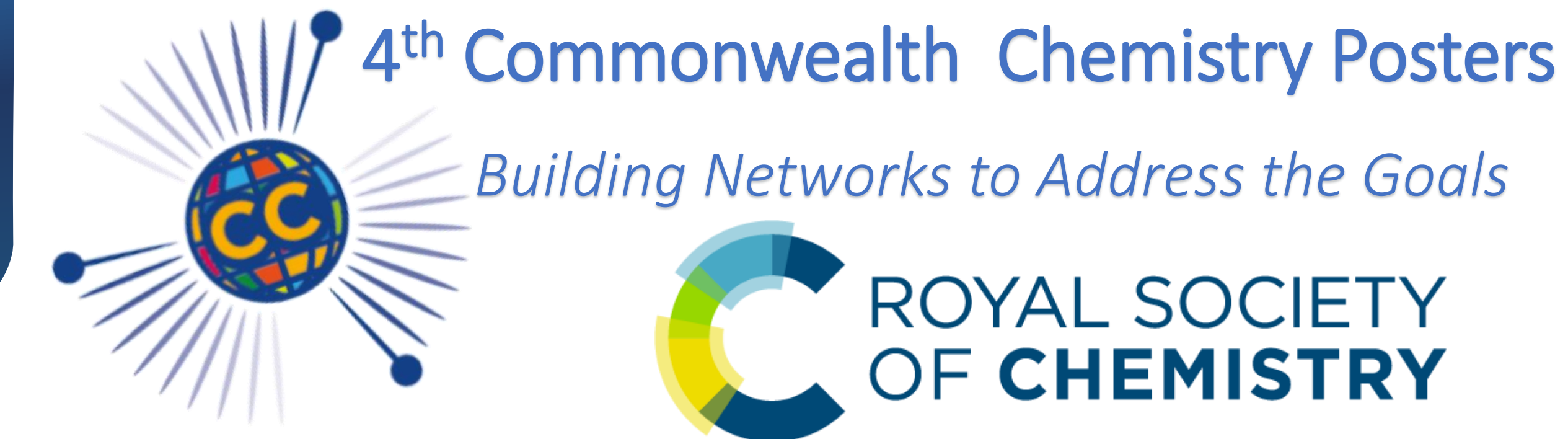




Metal-organic framework-based antifouling PVDF composite membranes with enhanced antifouling features for oil-water mixture and emulsion separation

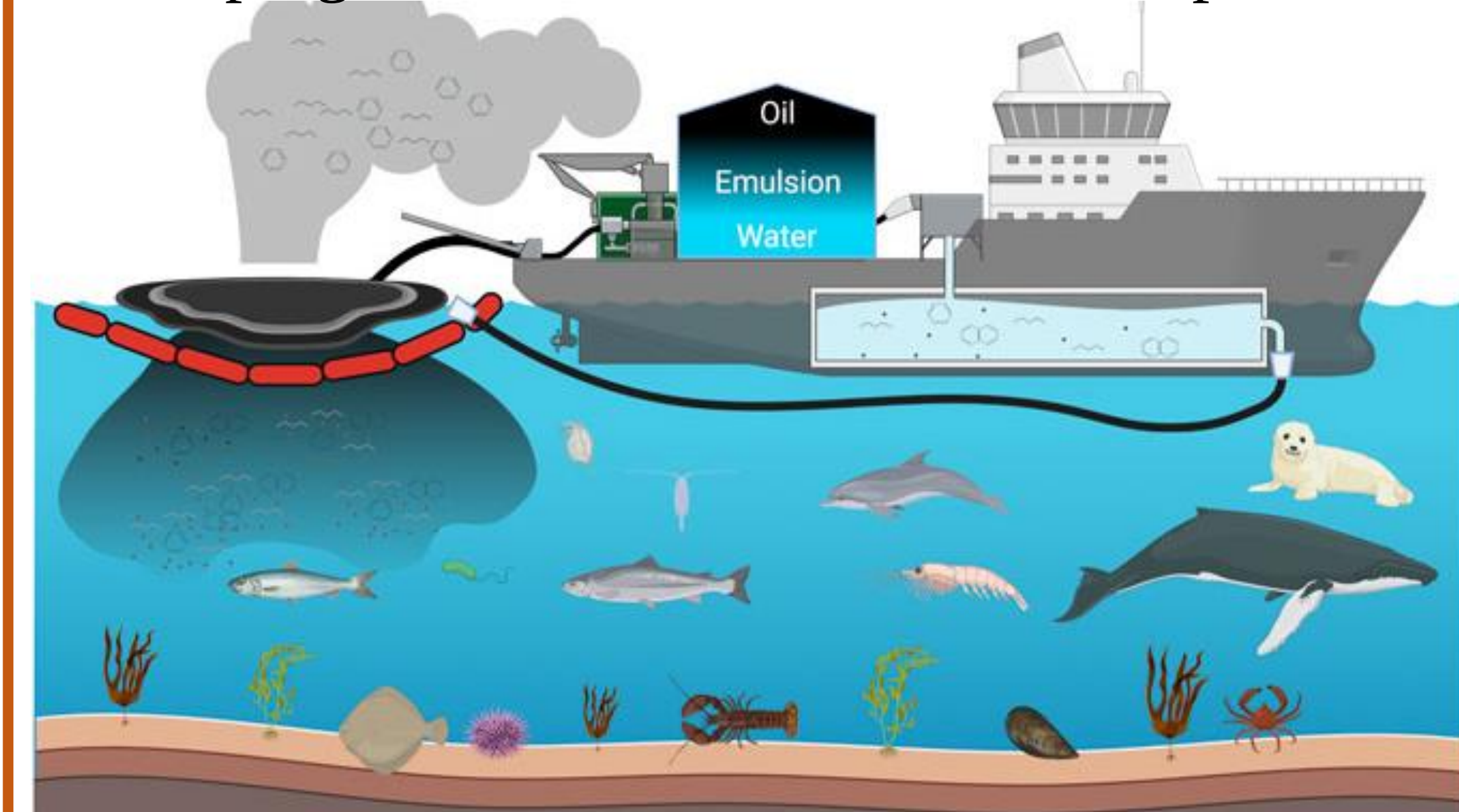


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Introduction

Oil-water pollution is a major environmental issue that affects on aquatic ecosystems. Accidental oil spills, leaks and discharges from industrial and municipal waste are major sources. Traditional methods for oil-water separation are time-consuming and inefficient, especially for complex mixtures. Therefore, there is a growing interest in developing new methods for oil-water separation.



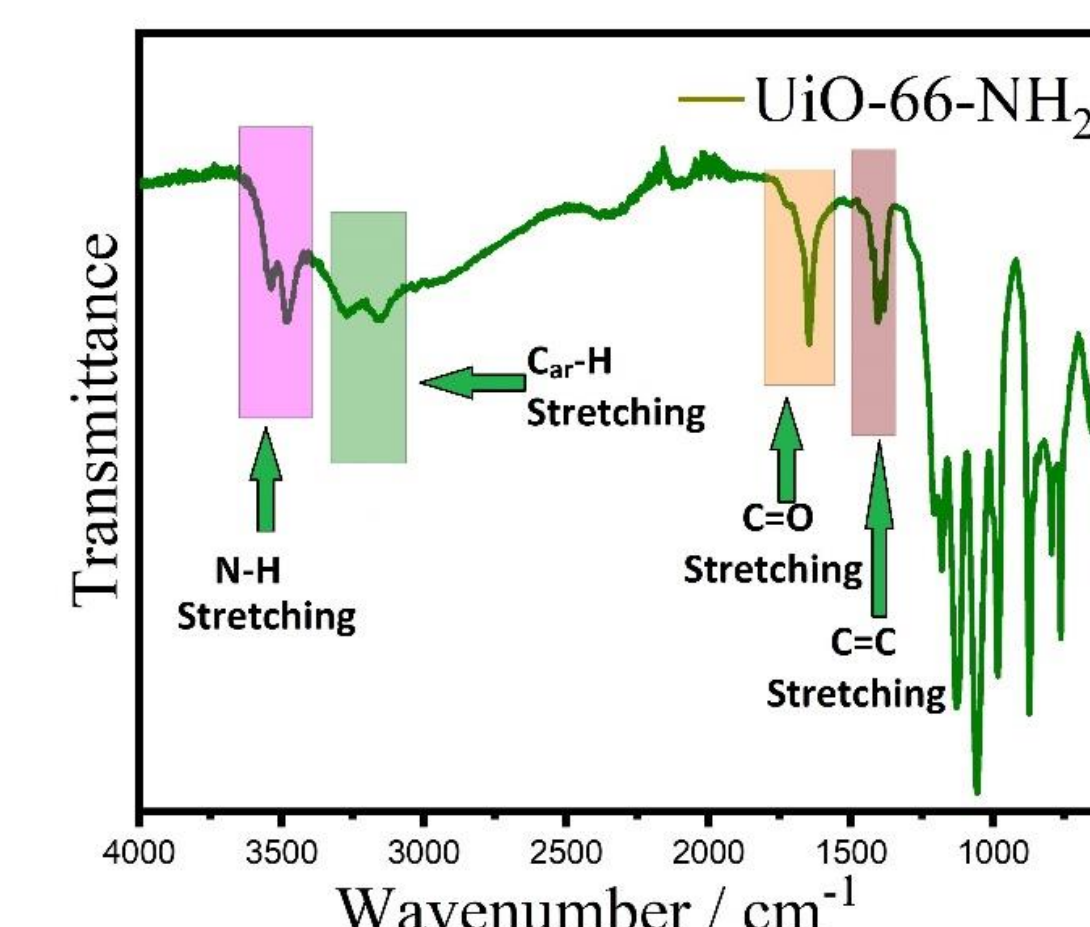
Research Objectives:

MOFs are a class of porous materials with high selectivity/permeability, so using MOF-based membranes, consisting of a thin layer of MOF crystals deposited on a support material, can be an effective solution.

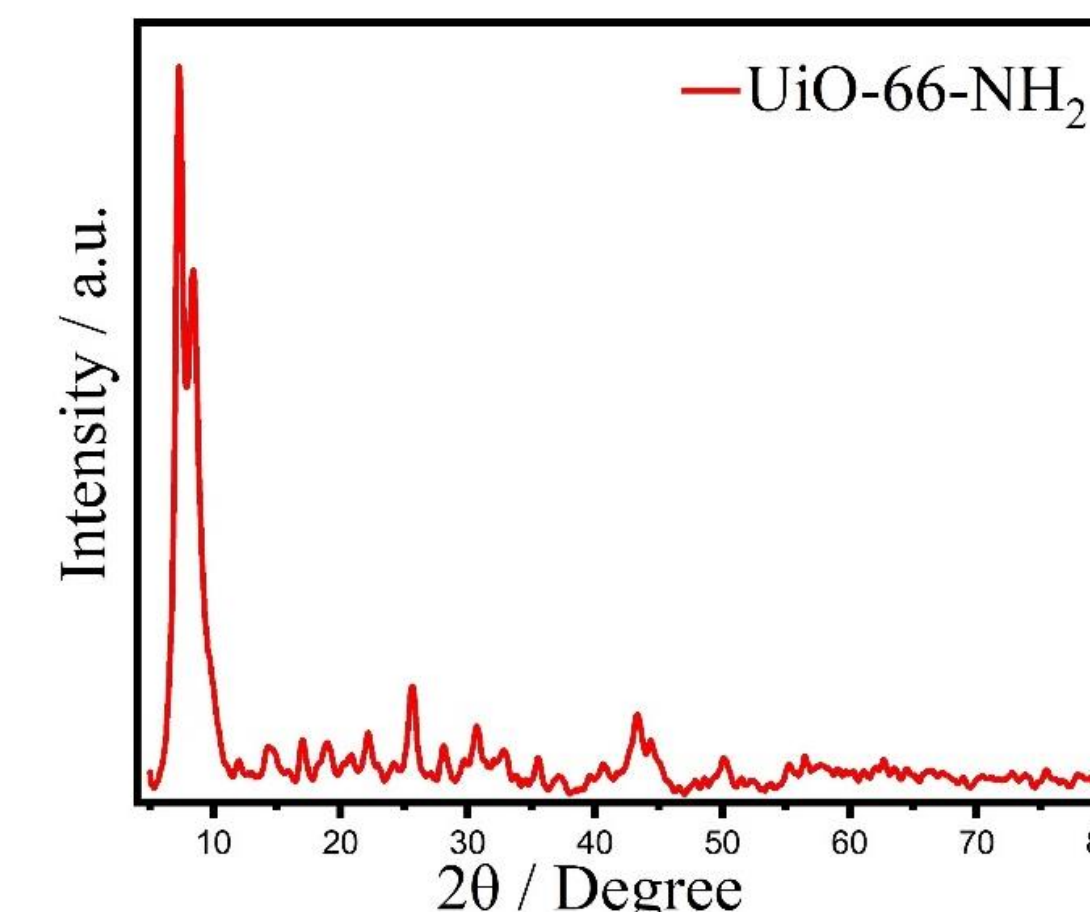
PVDF (0.22 μm) was modified with UiO-66-NH₂ to achieve:

- Hydrophilicity
- Antifouling Properties
- High water flux
- Efficient oil water separation
- Durability

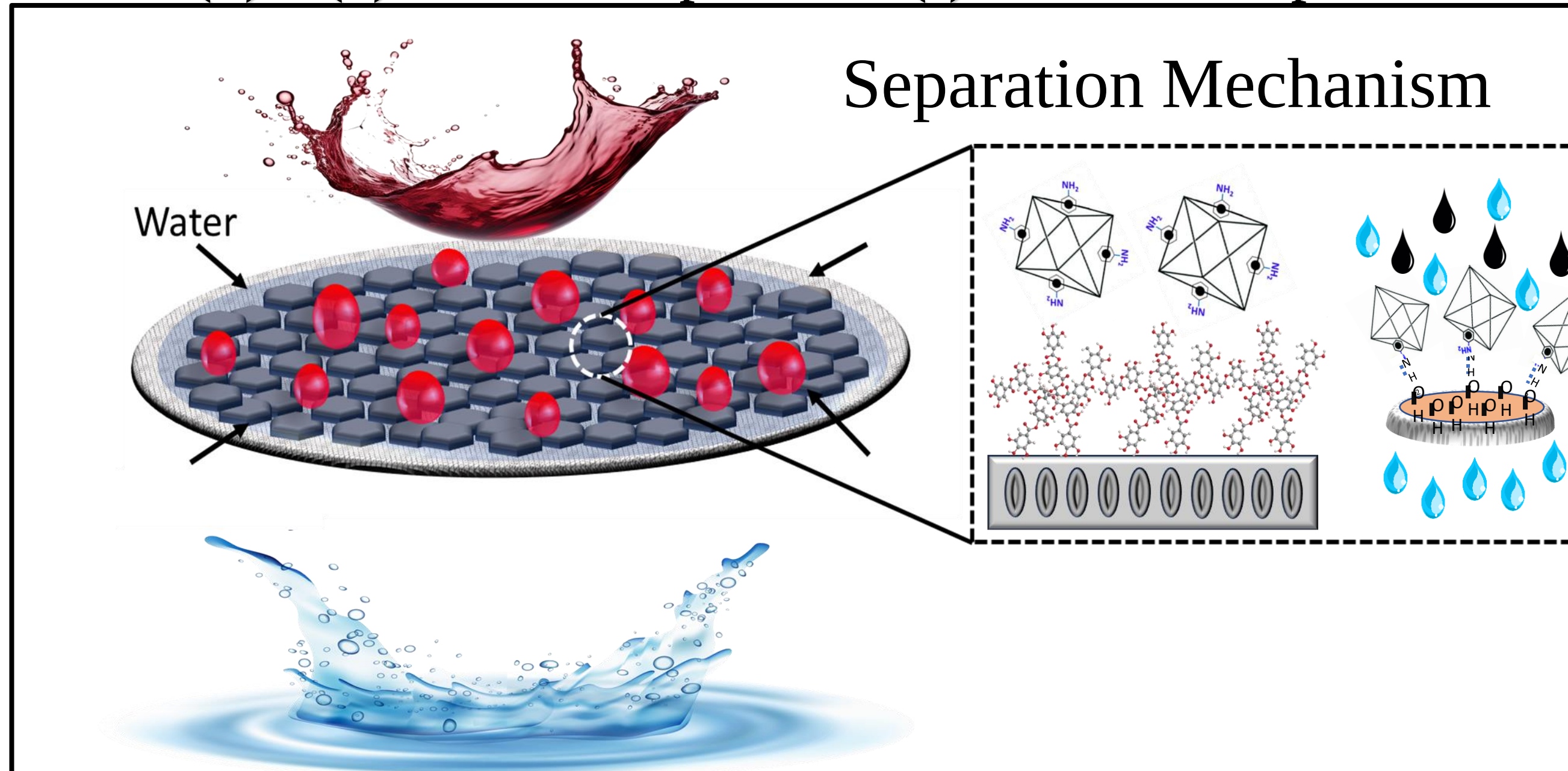
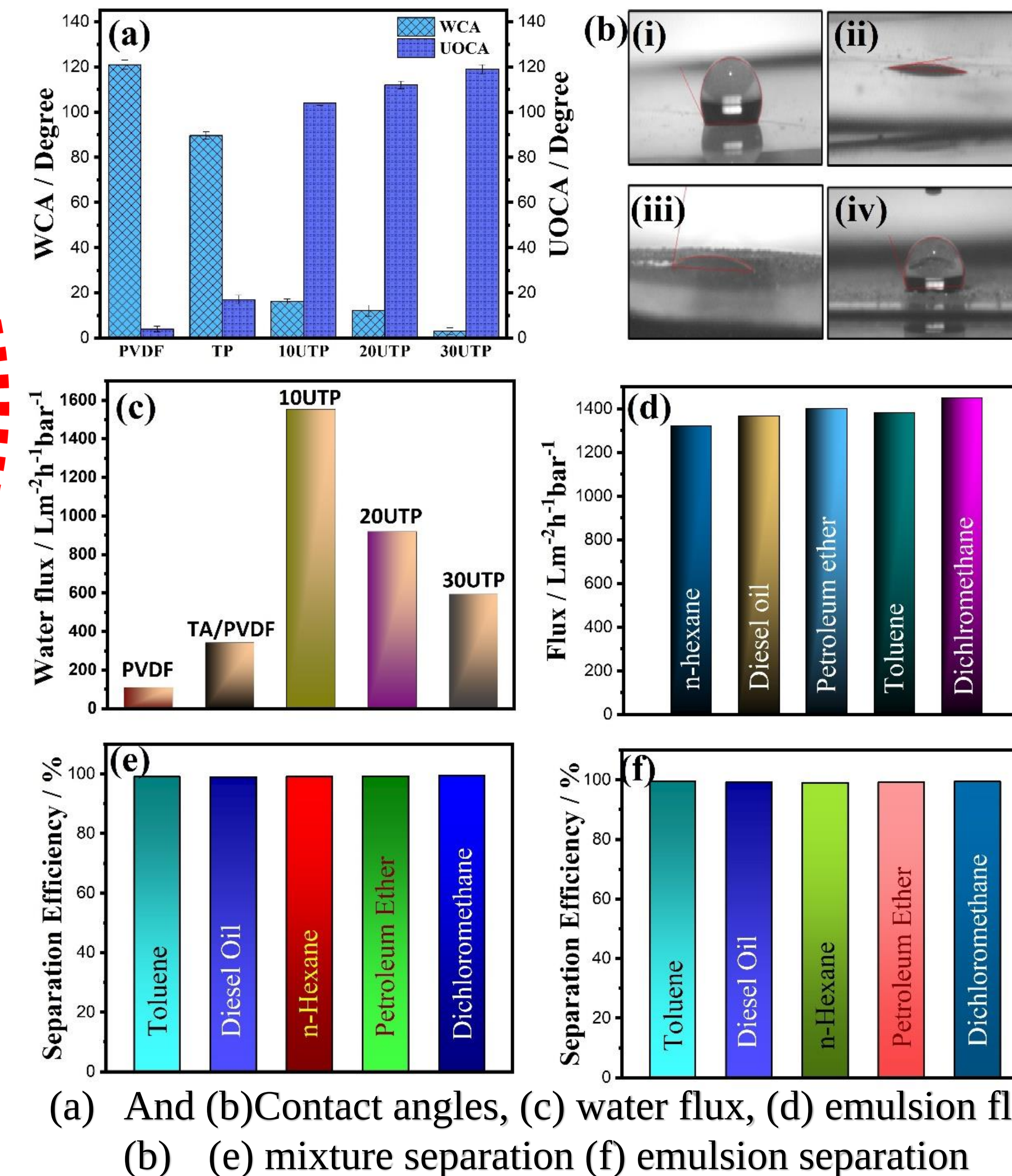
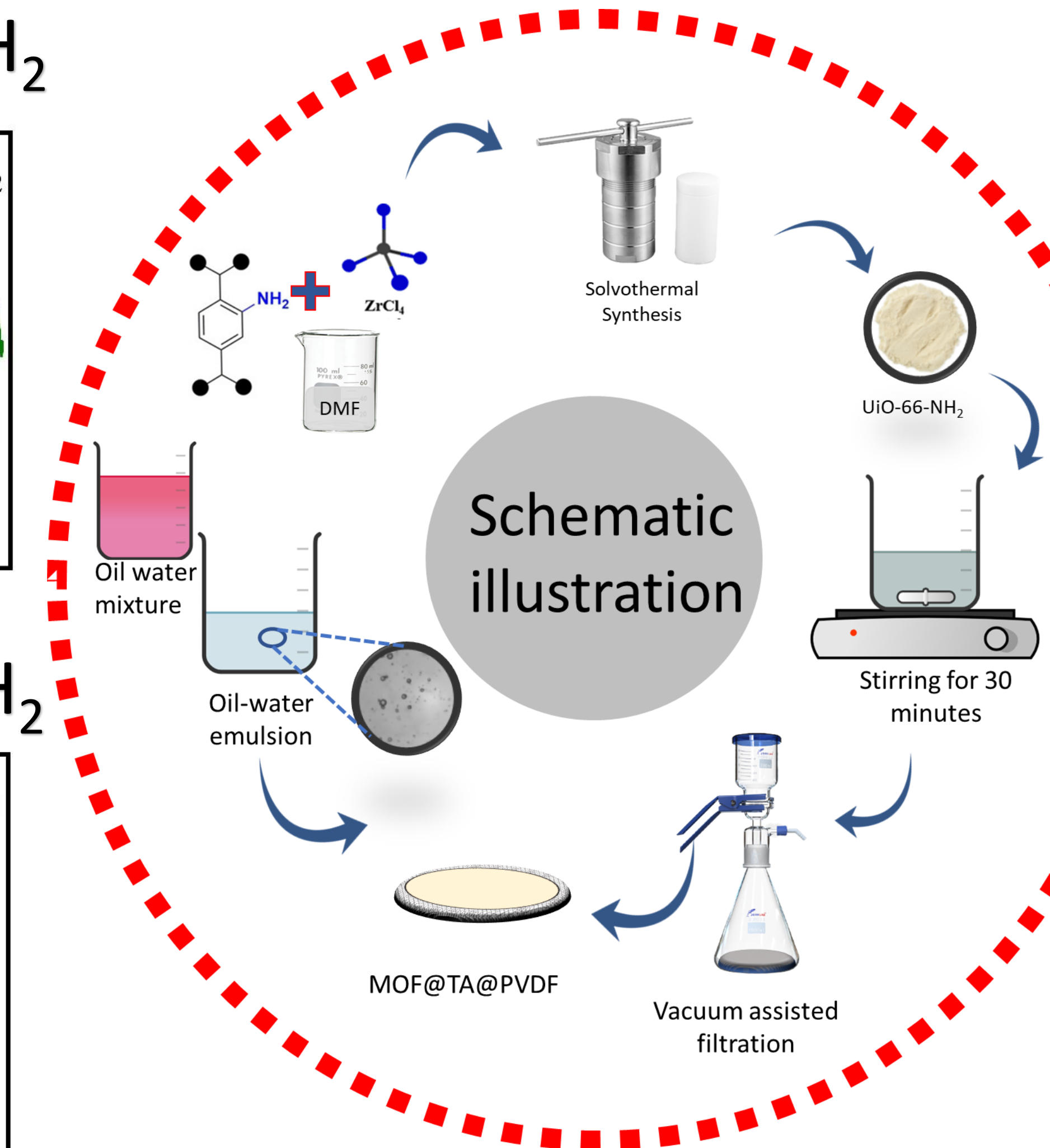
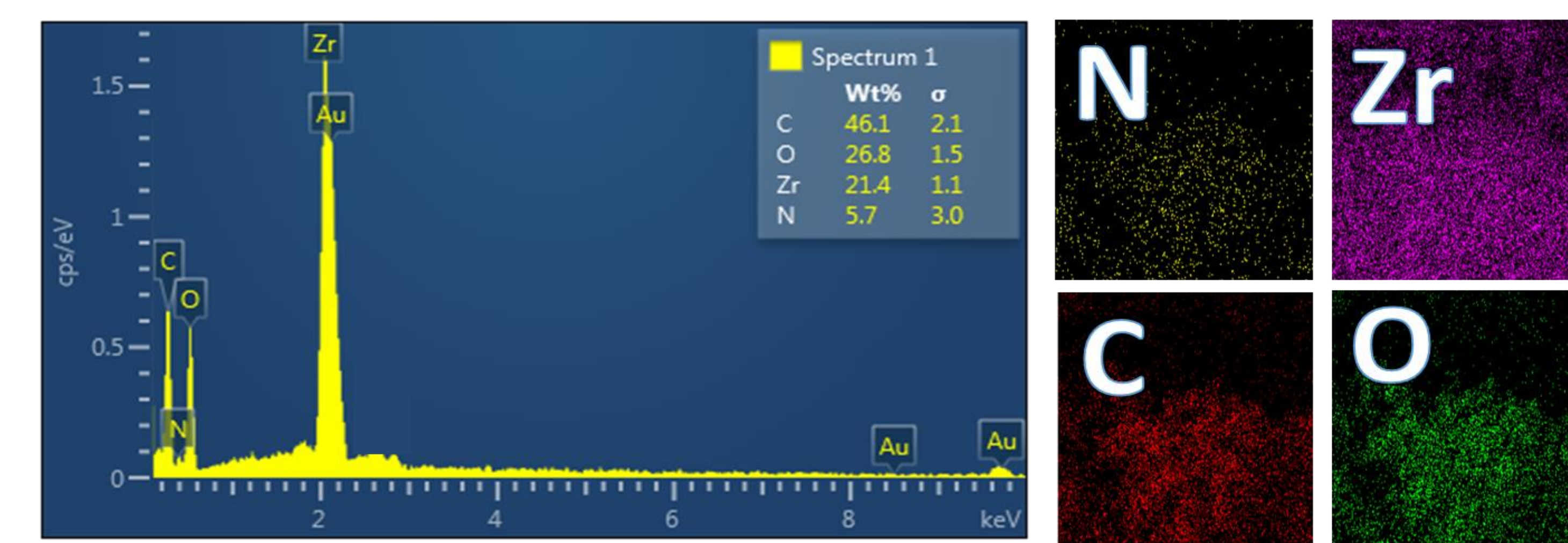
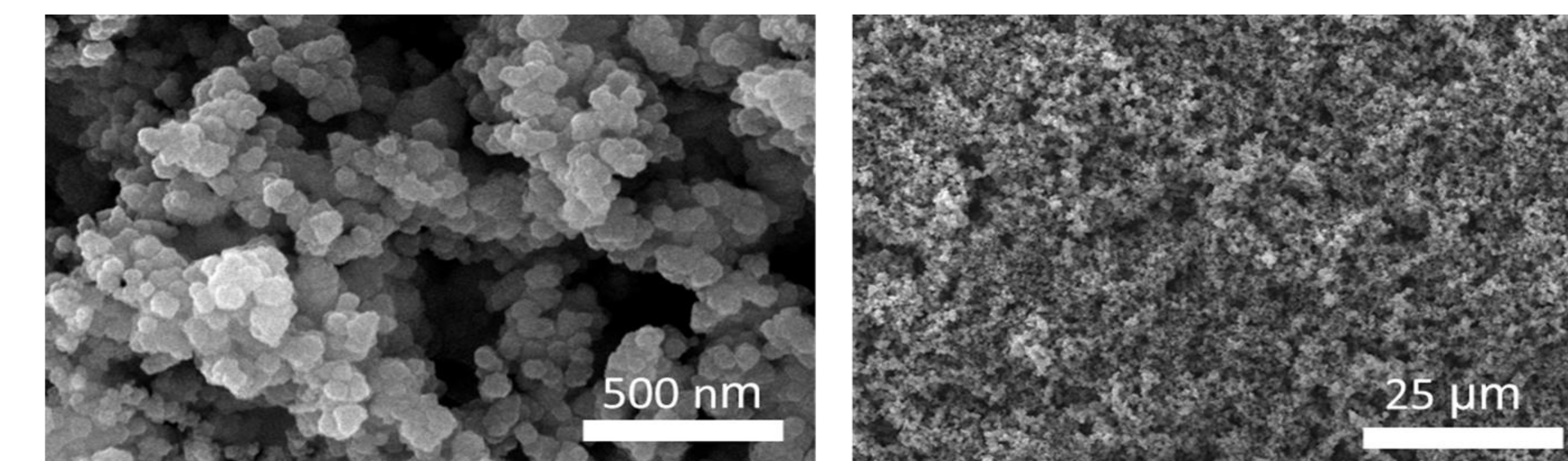
FTIR of UiO-66-NH₂



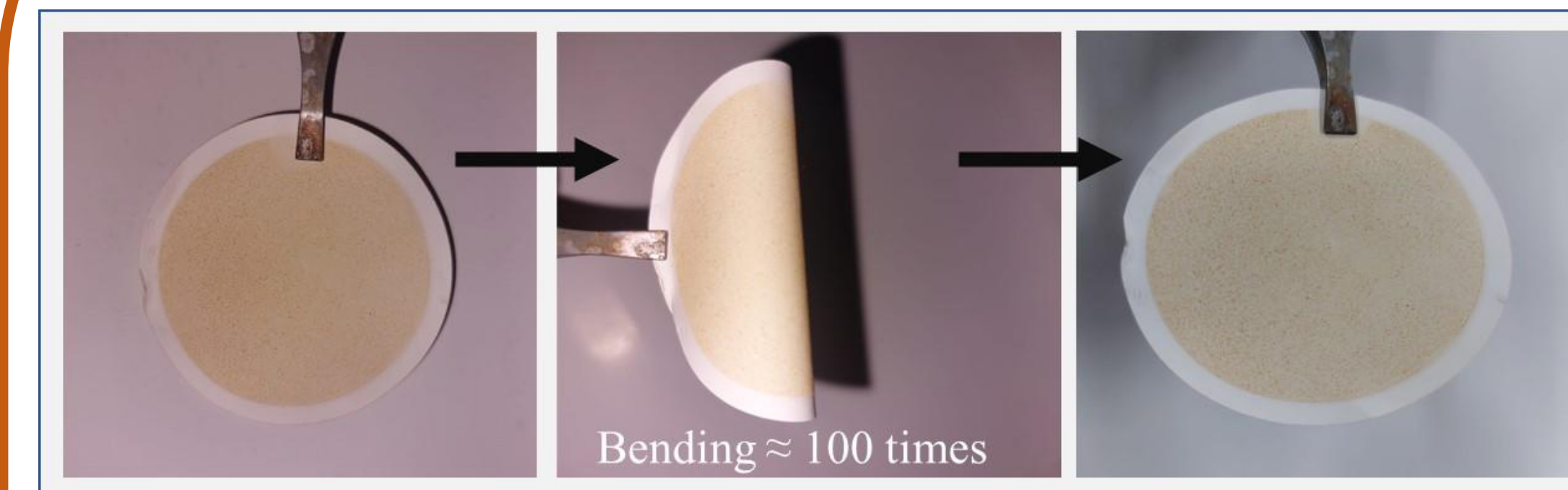
XRD of UiO-66-NH₂



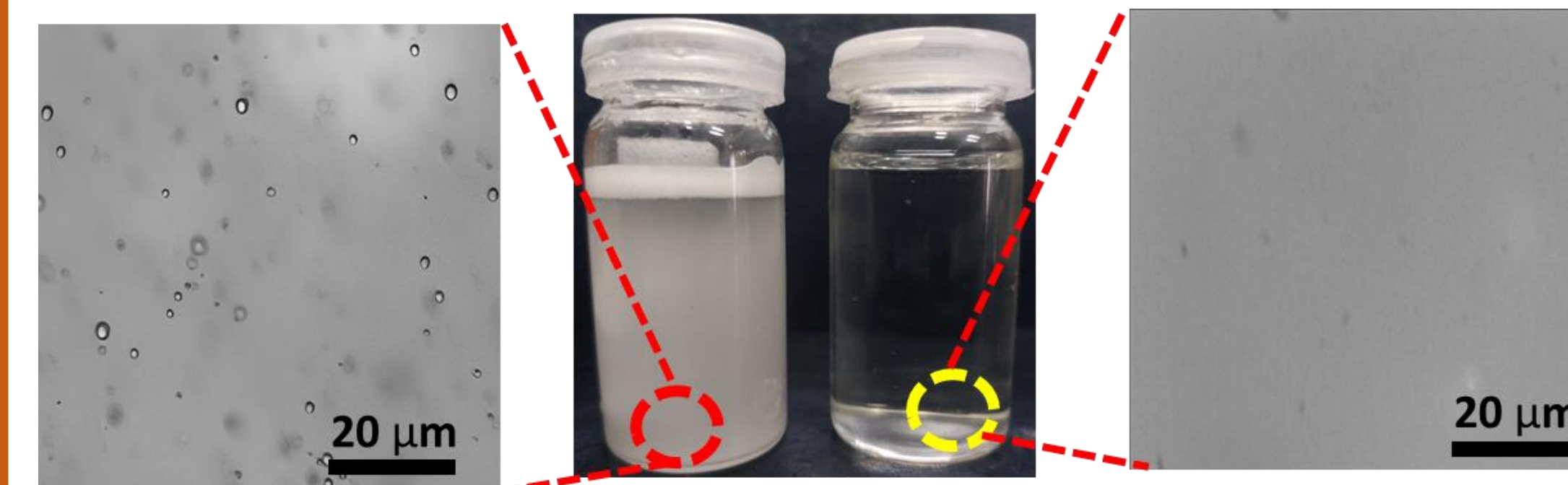
SEM/EDX of membrane modified with UiO-66-NH₂



Bending Test of the modified membrane

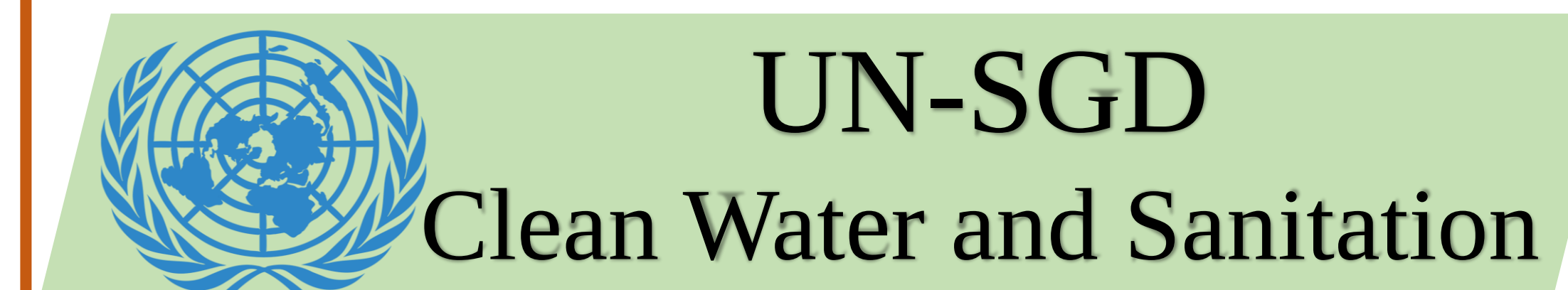


Microscope Images of Emulsions



Conclusion

- Novel Membrane exhibited super hydrophilicity and high-water flux
- Separation efficiency for both oil-water mixture and emulsions was > 98 %.
- This represents the great prospect of this membrane for larger-scale applications to treat spills and industrial discharges.



Ensuring the availability and sustainable management of clean water resources
Promoting access to clean and safe drinking water
Thus, it plays a crucial role in achieving SDG 6's objectives of clean water and sanitation for all.