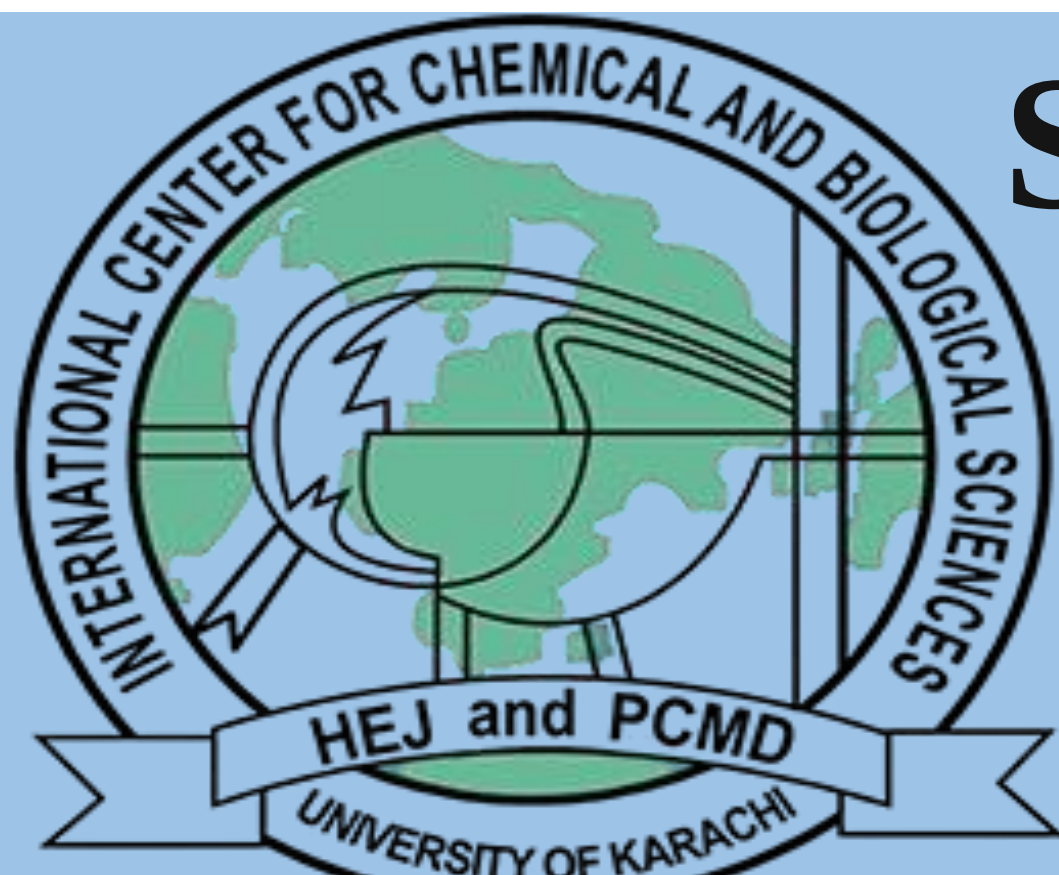


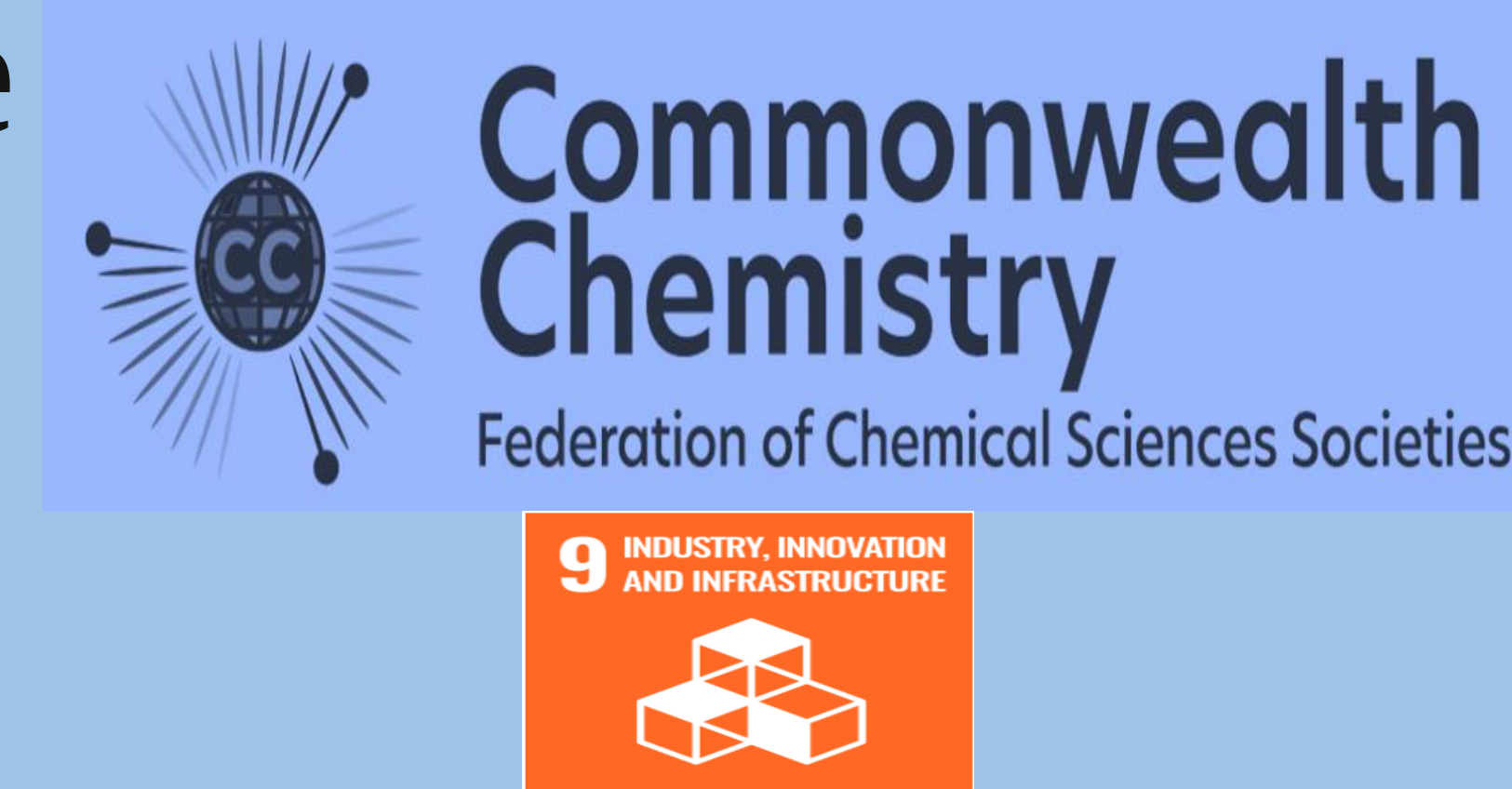


# Smartphone-Assisted EY@MOF-5-Based Dual-Emission Fluorescent Sensor for Rapid On-Site Detection of Daclatasvir and Nitenpyram

**Tehreem Kanwal**, Mahjabeen Hassan, Dilshad Hussain\*

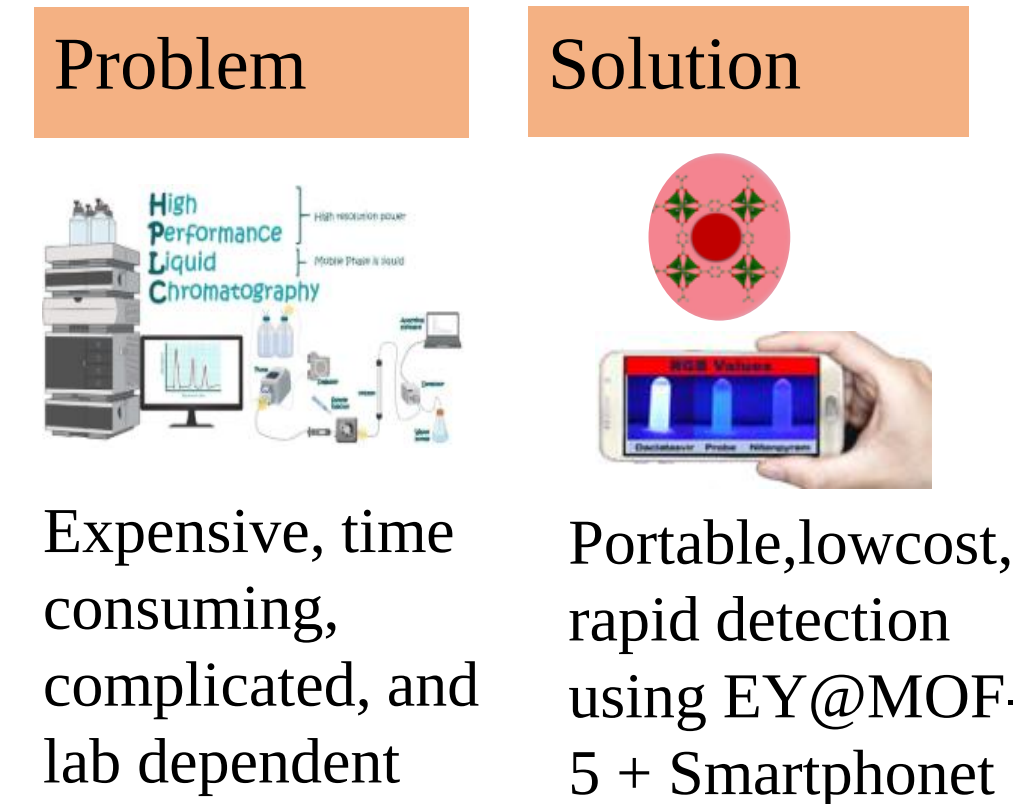
HEJ Research Institute of Chemistry, International Center for Chemical and Biological Sciences (ICCBS) University of Karachi

Email: Tehreemkanwal000@gmail.com



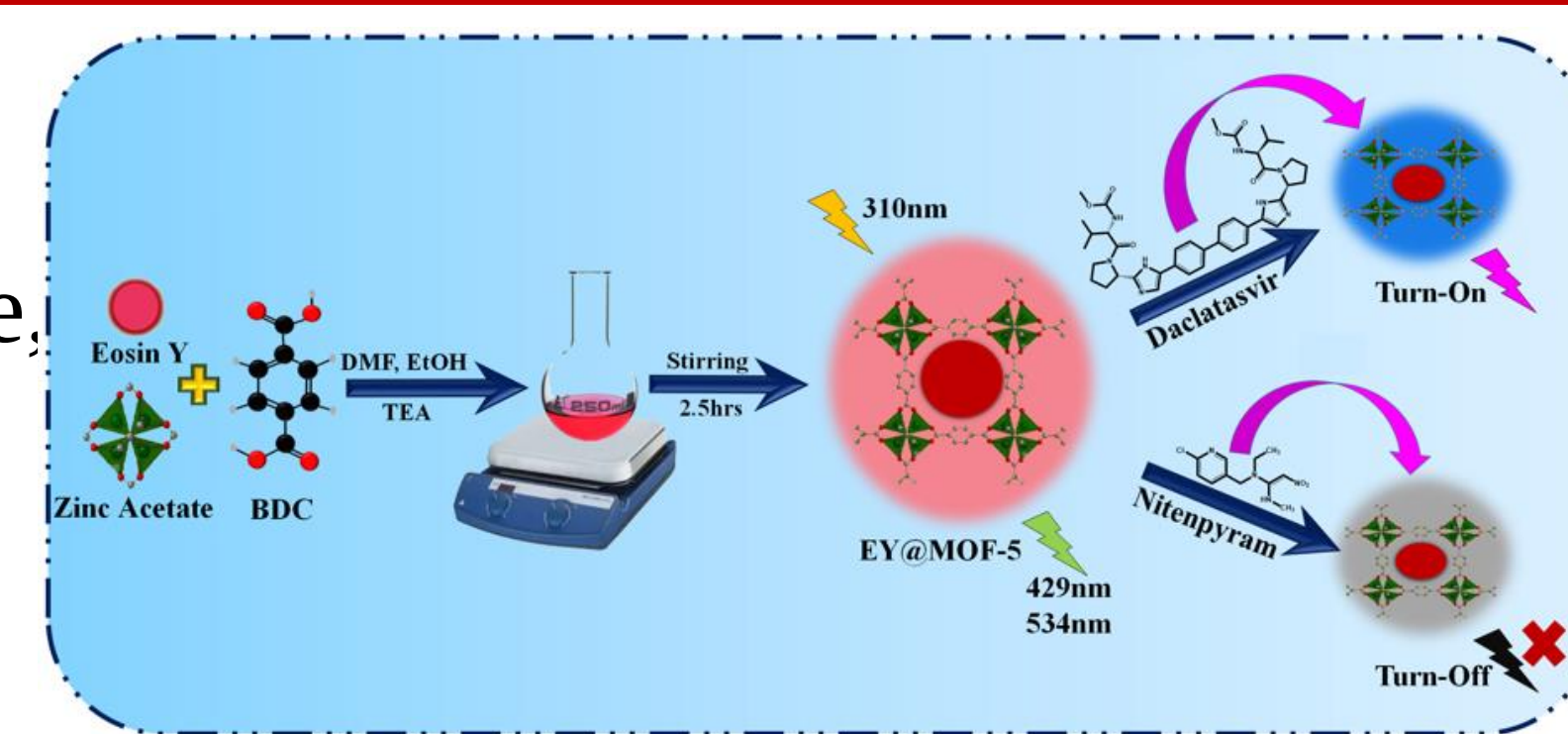
## Introduction

- ❖ Metal–Organic Frameworks (MOFs), such as MOF-5, are highly porous materials with tunable structures ideal for sensing.
- ❖ Encapsulating fluorescent dyes like Eosin Y enhances their optical properties, enabling dual-emission sensing.
- ❖ Sensitive detection of analytes like Daclatasvir (an antiviral drug) and Nitenpyram (a pesticide) is crucial due to their potential health hazards, environmental impact, and the need for regulatory monitoring.
- ❖ Traditional detection techniques have many drawbacks, highlighting the need for rapid, on-site, and user-friendly sensing systems.
- ❖ Integrating fluorescent sensors with smartphone-based analysis provides a modern solution for portable, real-time detection in both biological and environmental contexts.

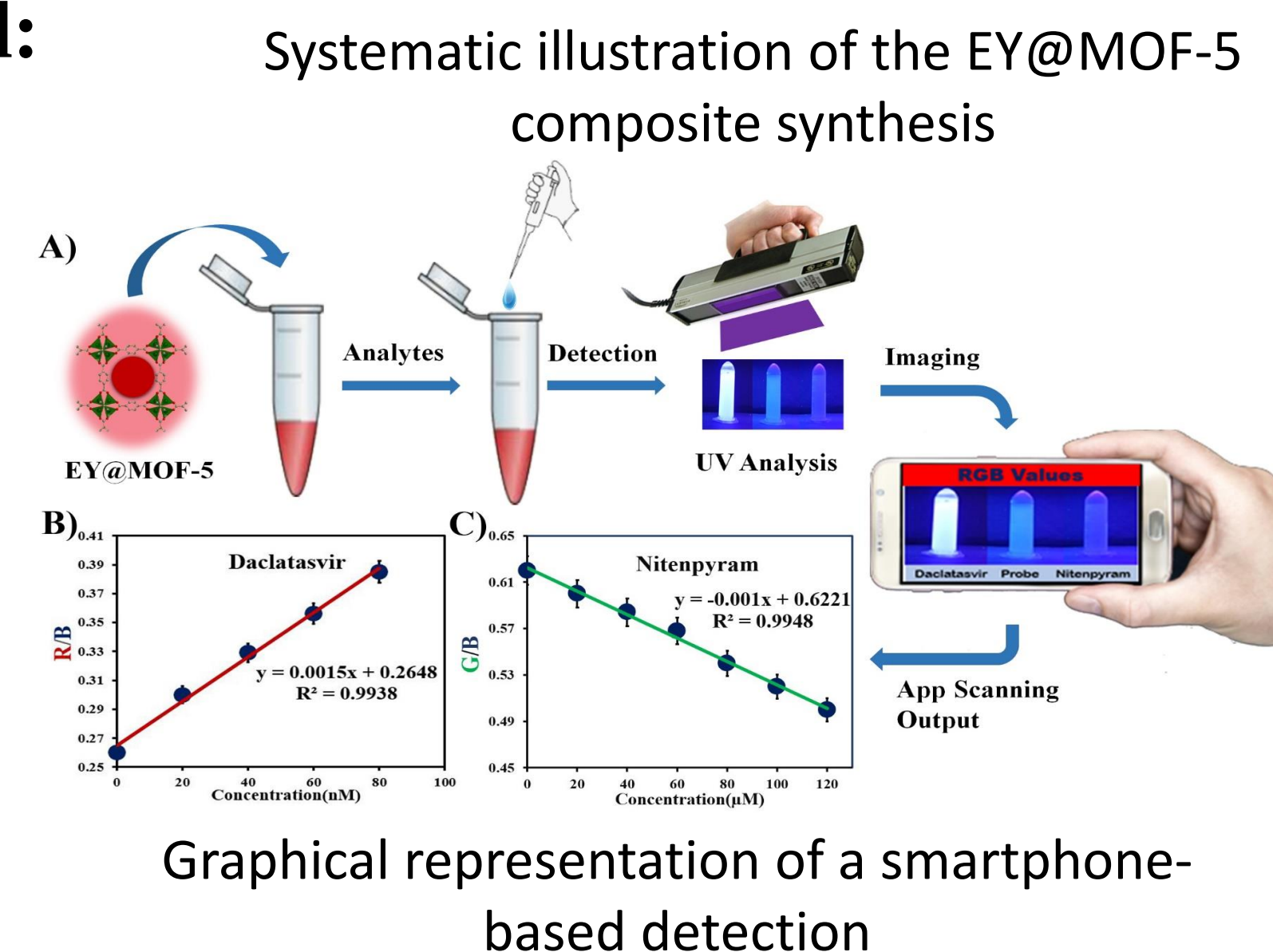


## Methodology

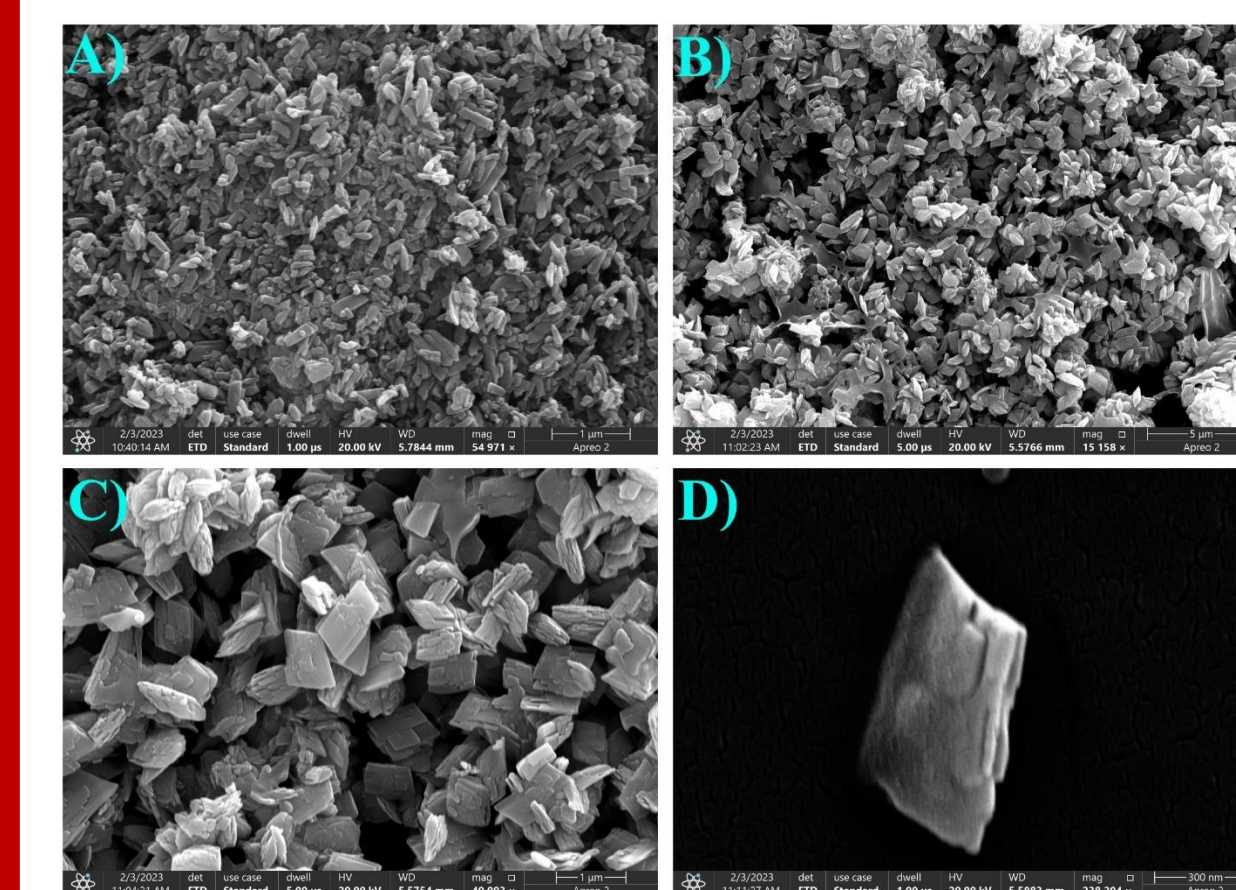
- ❖ **Synthesis of EY@MOF-5:**  
The probe was synthesized via a one-pot self-assembly approach using zinc acetate, terephthalic acid, and Eosin Y to achieve dual emission sensing performance.



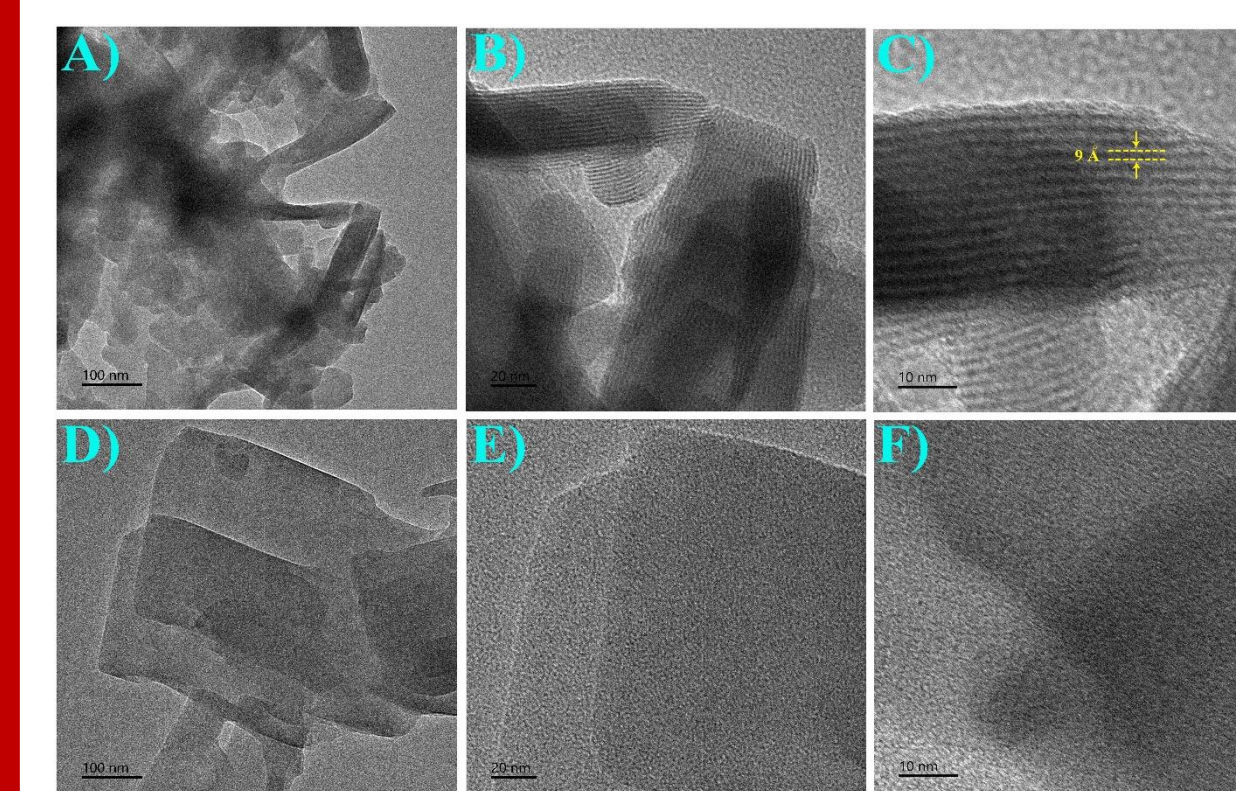
- ❖ **Spectrofluorimetric sensing method:**  
The EY@MOF-5 probe detects (DCT) and (NTP) via turn-on and turn-off FL mechanisms, respectively.
- ❖ **Smartphone integrated sensing method:**  
A smartphone-based method analyzed images to determine the concentration of DCT and NTP using RGB data and Calibration plots.



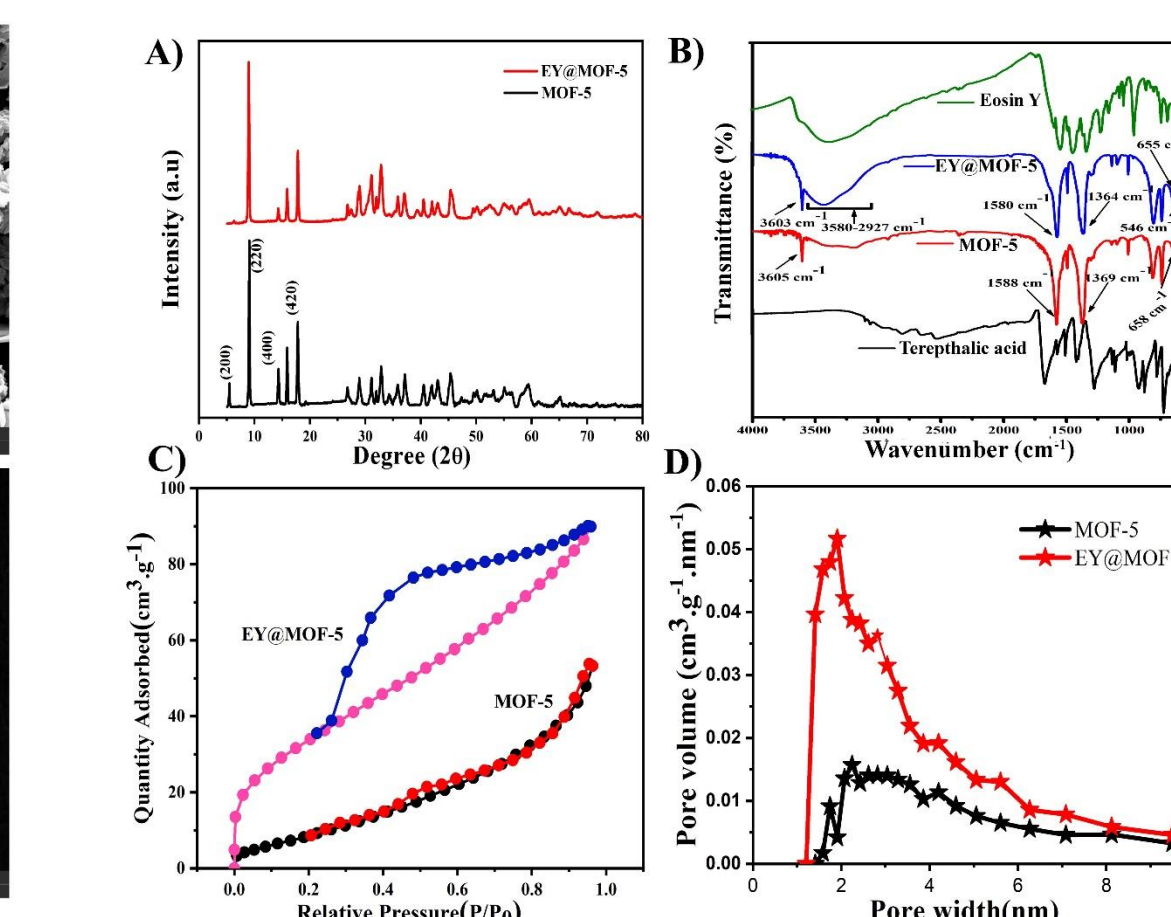
## Characterization



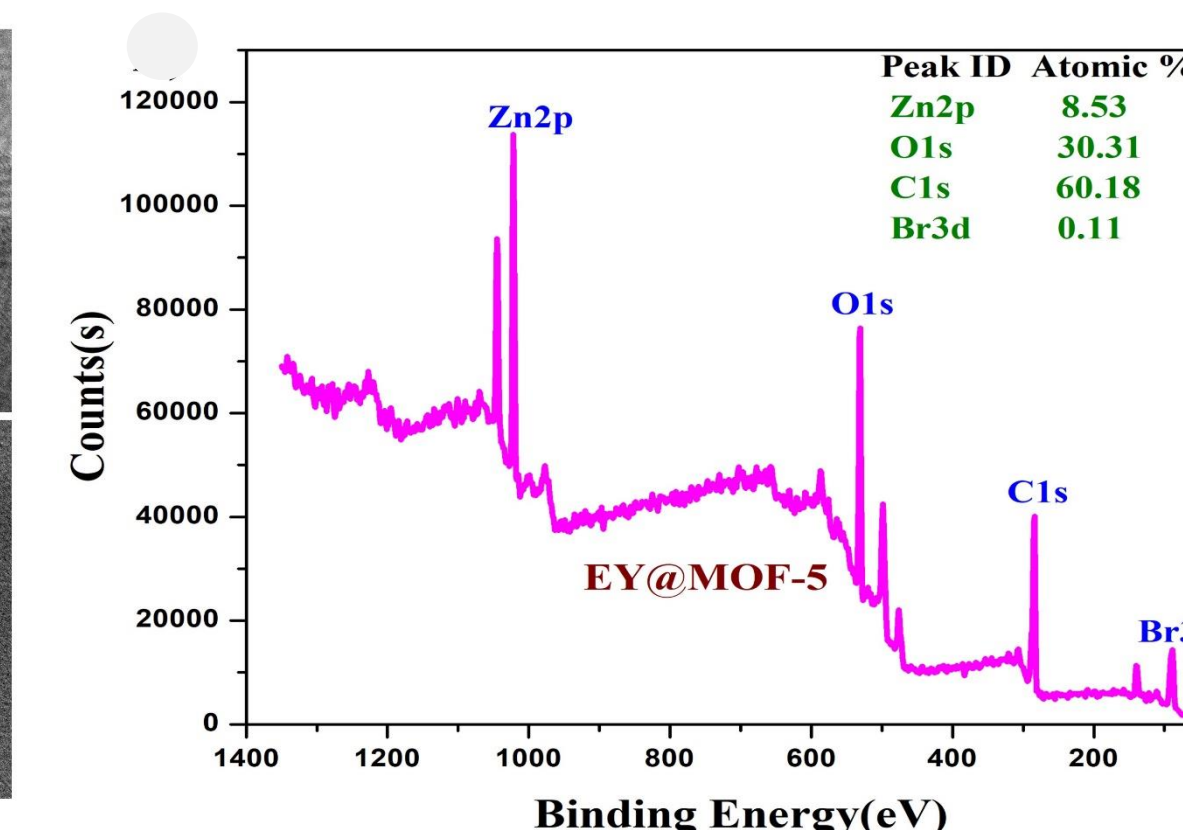
SEM images of (A) MOF-5, (B-D) EY@MOF-5



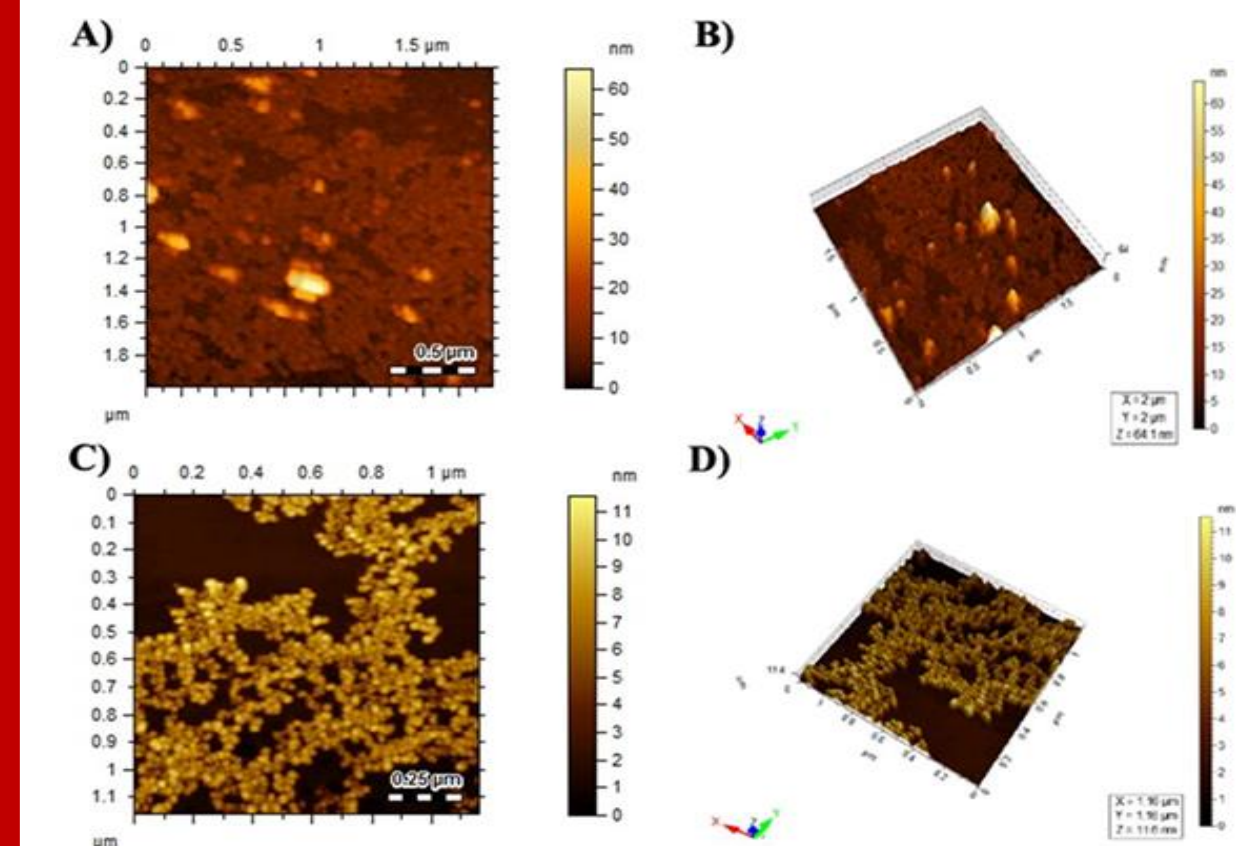
TEM images of MOF-5 (A-C), and EY@MOF-5 (D-F)



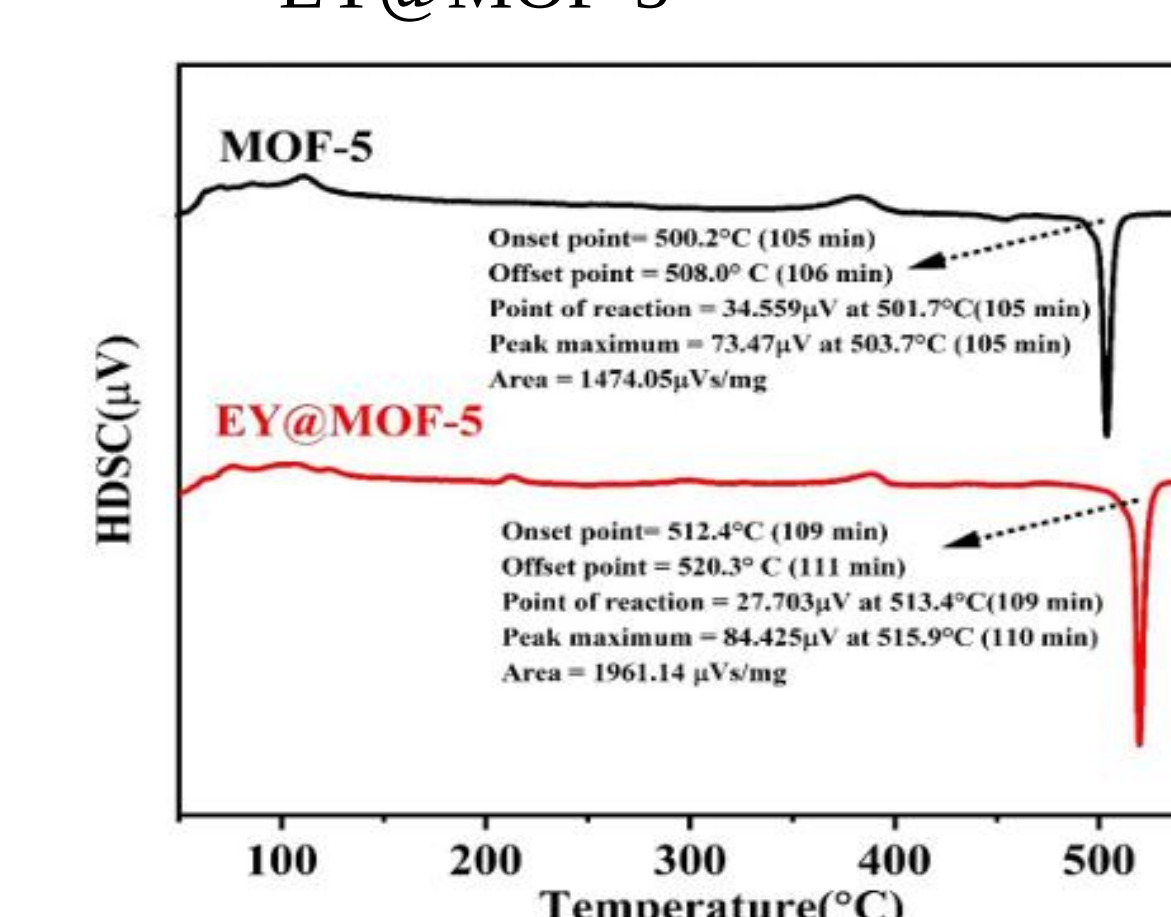
(A) XRD patterns, (B) FT-IR spectrum, (C) nitrogen adsorption isotherms, and (D) pore size distribution



XPS survey scan spectrum of EY@MOF-5 and deconvoluted spectra for EY@MOF-5



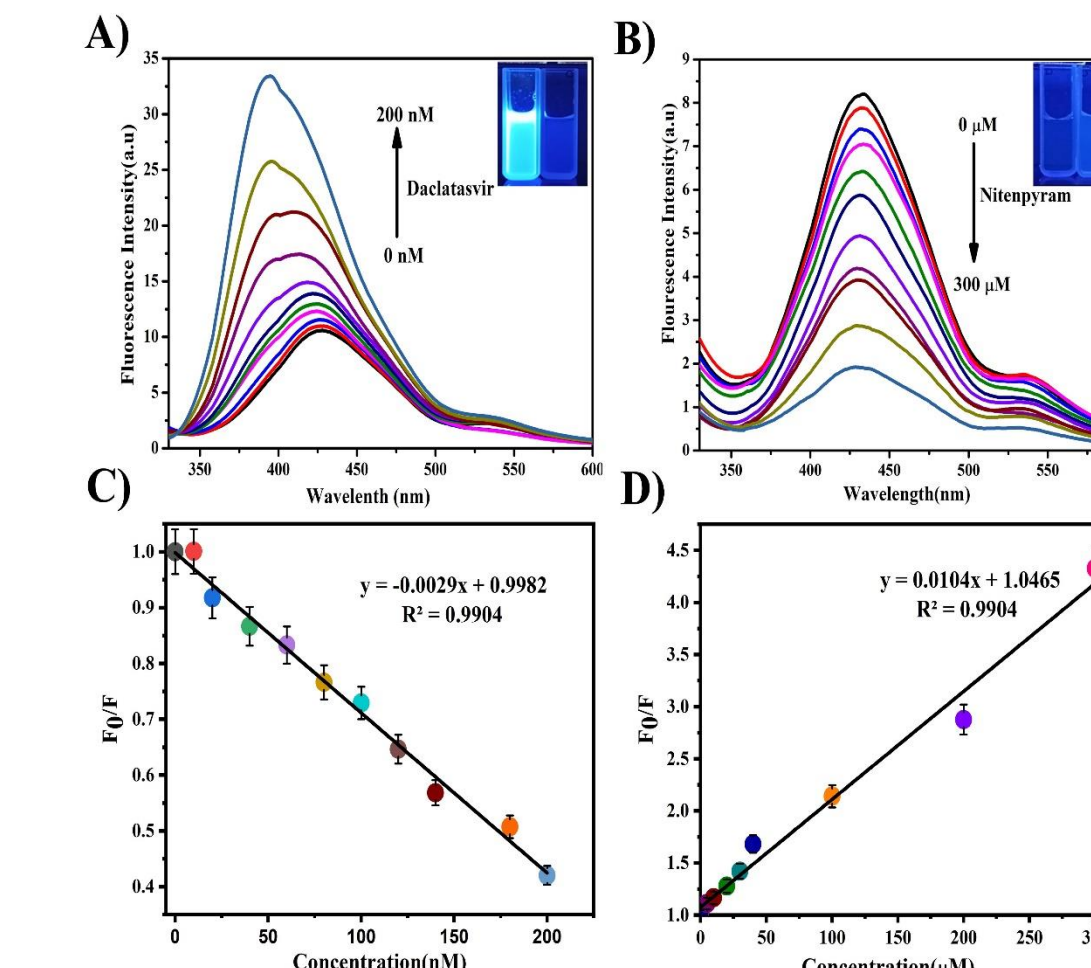
AFM images of (A, B) MOF-5 and (C, D) EY@MOF-5.



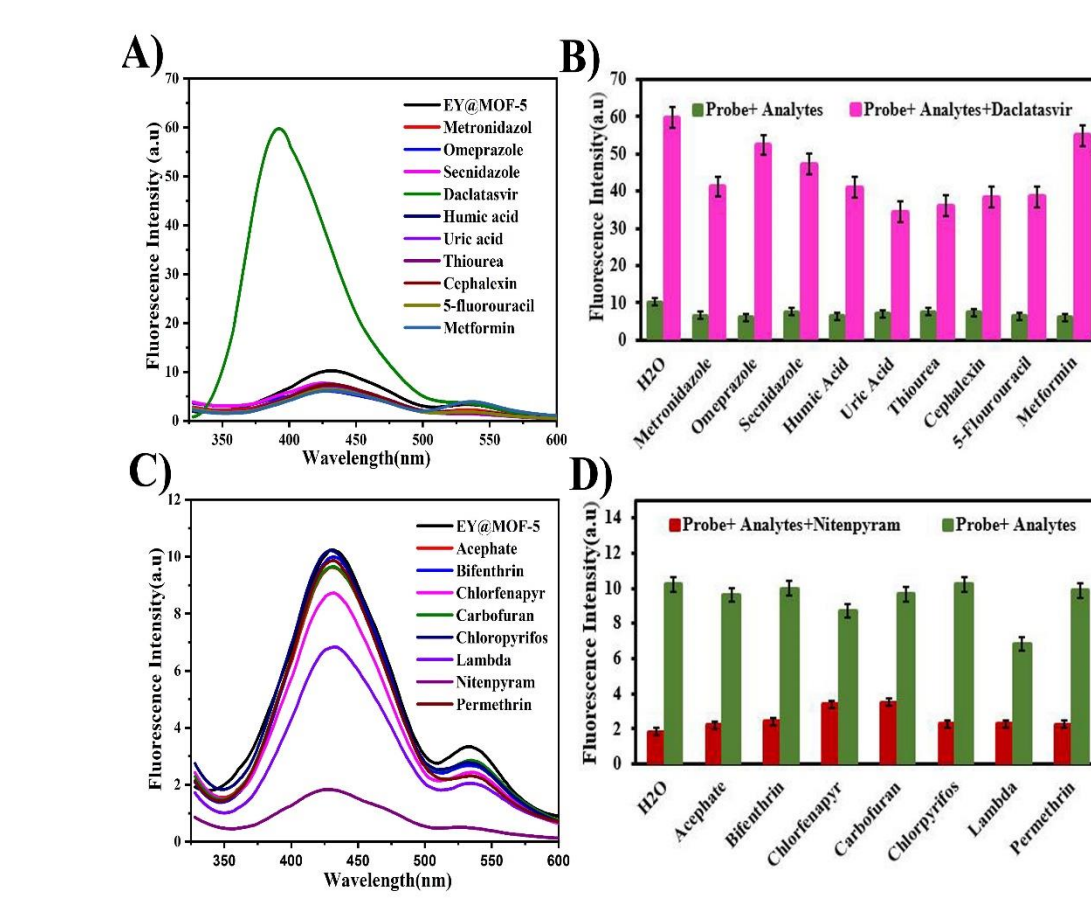
DSC curves of MOF-5 and EY@MOF-5.

## Results and Discussion

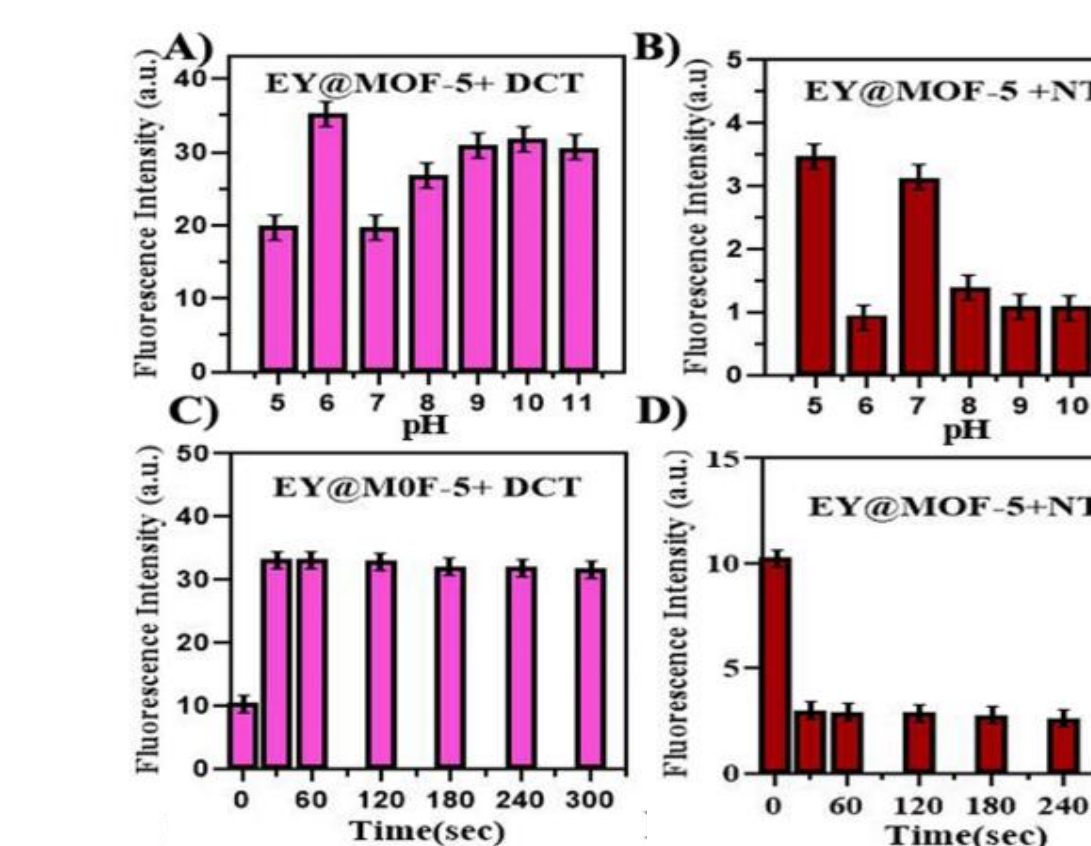
### Detection Strategies and Mechanism



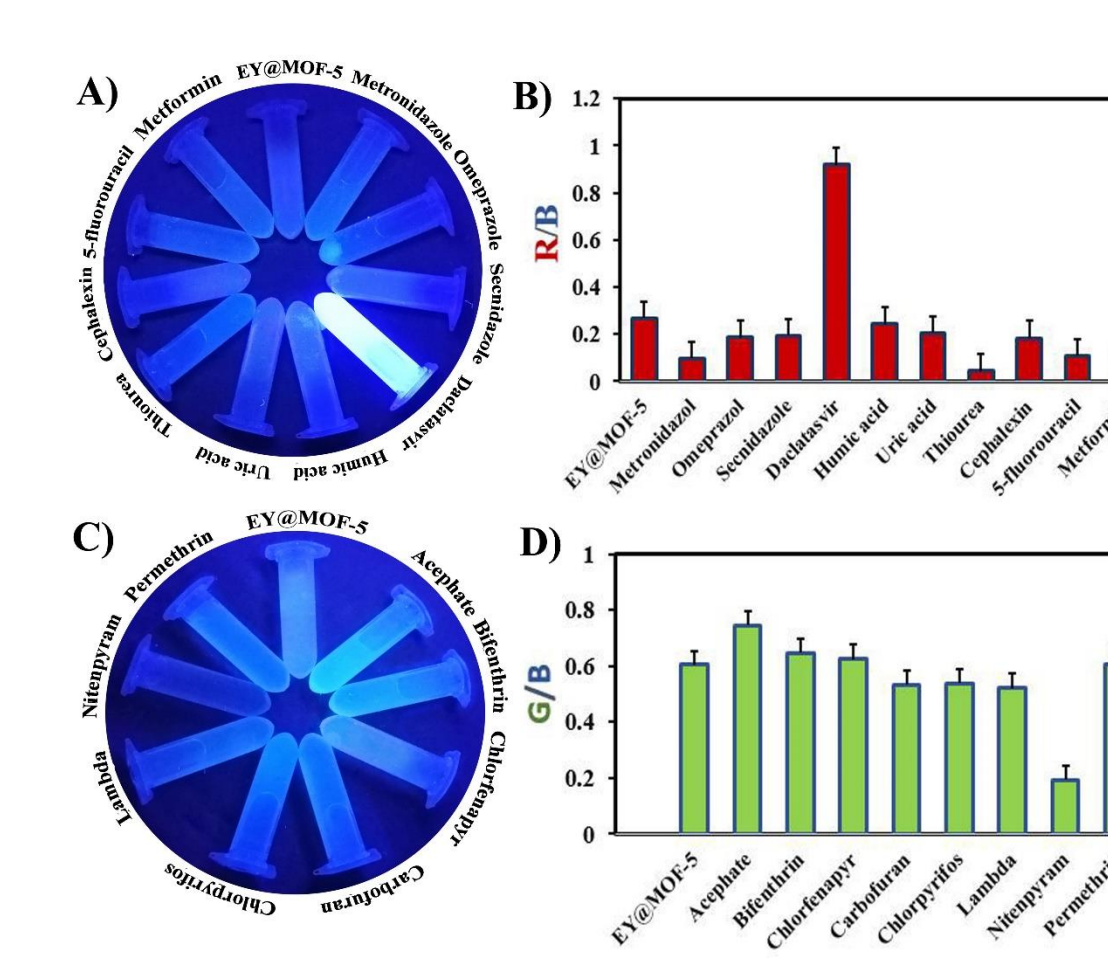
FL spectra of EY@MOF-5 at different concentrations of (A) DCT and (B) NTP. Linear calibration curve of (C) DCT and (D) NTP



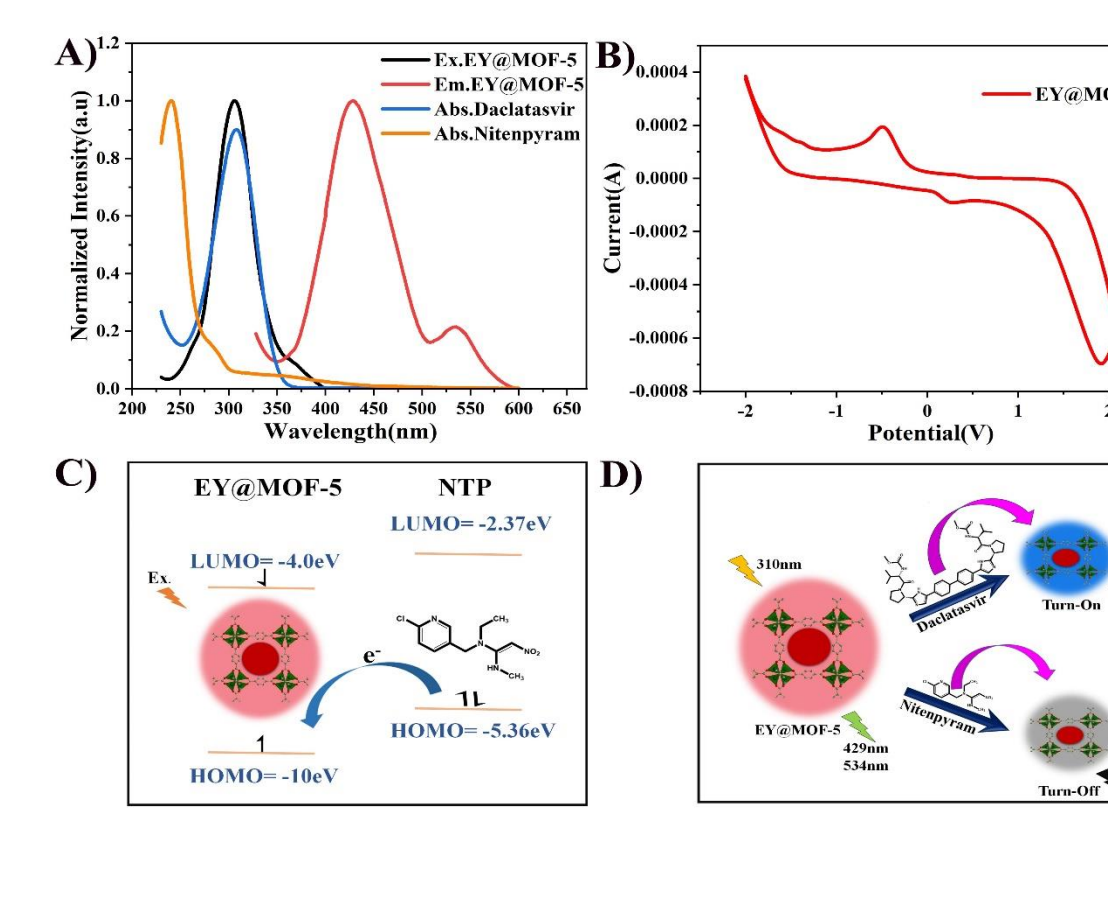
Sensitivity and selectivity studies of EY@MOF-5 for drugs (A and B) for pesticides (C and D)



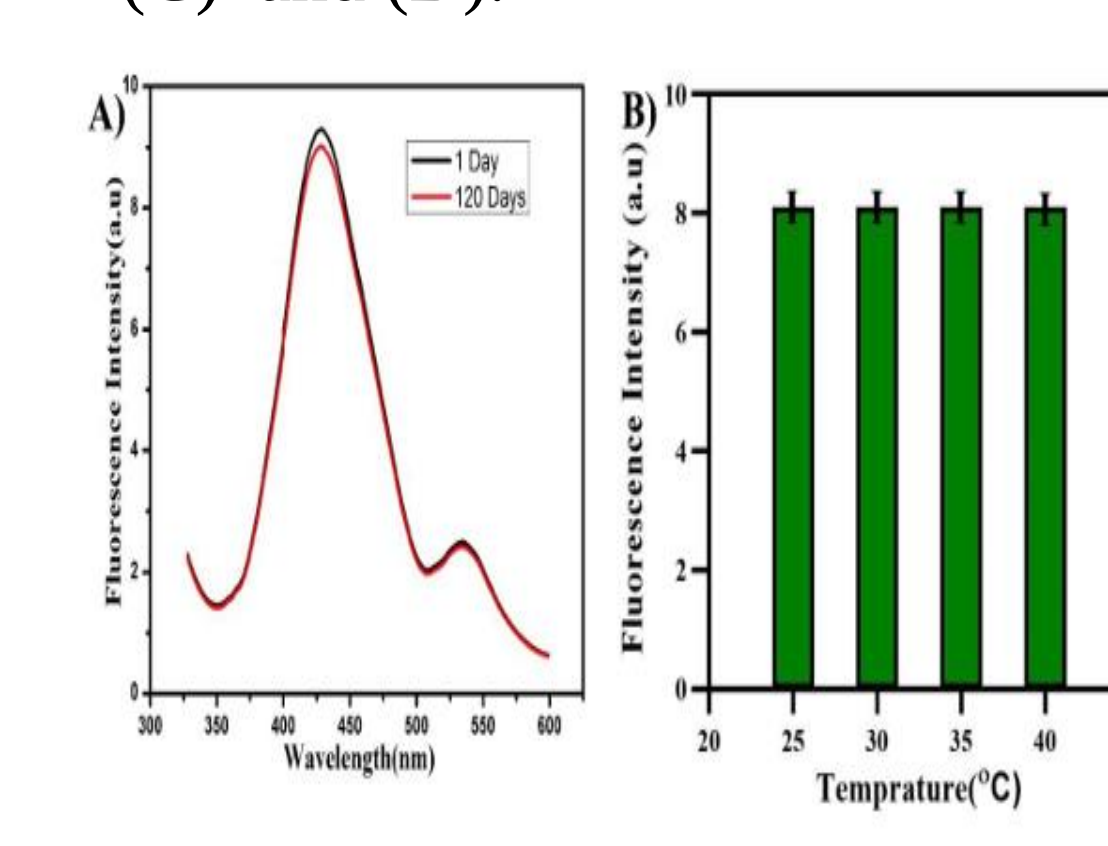
FL response of EY@MOF-5 in DCT and NTP solutions at pH ranging from 5-9 (A-B), different times (C-D)



Sensitivity and selectivity studies of EY@MOF-5 for drugs (A and B) for pesticides (C and D)



(A) Ex. and Em. and UV spectra, (B) CV of EY@MOF-5, and sensing mechanism (C) and (D).



FL response of EY@MOF-5 in different days (A) and at different temperatures (B).

## Summary

- ❖ Successfully developed a novel dual-emission fluorescent sensor by encapsulating eosin y in MOF-5 (EY@MOF-5) with superior sensitivity and selectivity.
- ❖ Demonstrated simultaneous and selective detection of Daclatasvir and Nitenpyram in complex real samples with excellent recovery.
- ❖ Introduced a smartphone-assisted RGB sensing platform, offering a cost-effective, portable, and user-friendly alternative to conventional methods.
- ❖ This work presents a promising strategy for next-generation on-site diagnostics and environmental monitoring, bridging advanced materials with digital technology.

## Reference

1. Kanwal, T., Rasheed, S., Hassan, M., Fatima, B., Xiao, H. M., Musharraf, S. G., ... & Hussain, D. (2023). Smartphone-assisted EY@ MOF-5-based dual-emission fluorescent sensor for rapid on-site detection of daclatasvir and nitenpyram. *ACS Applied Materials & Interfaces*, 16(1), 1688-1704.

## Acknowledgment

HEJ Research Institute of Chemistry, International Center for Chemical and Biological Sciences (ICCBS) University of Karachi for providing essential resources and research facilities. Commonwealth Chemistry (Federation of chemical Science Society) for the support and recognition of this work within the global scientific community as the platform for our chemistry poster presentation.