SUPPORTING INFORMATION

Enhanced Visible Light-Driven Photocatalytic Degradation of Methylene Blue and Ciprofloxacin by Magnetic $NiFe_2O_4$@ZIF 67

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Catalyst characterization

PXRD patterns of the fabricated materials were examined via an X-ray diffraction instrument (Bruker D8 advanced) equipped with Cu-kα radiation (λ= 1.54 A°) within the 2θ range of 5° to 80° to analyse the samples to determine the crystal phase of the materials. FTIR spectra were measured to detect the functional group present in the synthesized materials by Thermo Scientific Nicolet iS5 Fourier-transform infrared spectrometer in the range of wave number 500 to 4000 cm^{-1} at room temperature. The light absorption properties were measured by Jasco V 770 Ultraviolet-Visible Diffuse Reflectance (UV–Vis DRS) spectrophotometer. The Field Emission Scanning Electron Microscopy (FESEM) images were captured using Gemini SEM 450instrument and Tungsten and LaB_6 as the source filament to analyse the morphology of the prepared samples. A Zeiss JEM-2010 F microscope was also used for transmission electron microscopy (TEM) investigation. The different vibration modes were analyzed using Renishaw Invia Raman microscope with a green 532 nm laser with a 10 s exposure time. The Photoluminescence (PL) spectra of the samples were measured by a fluorescence spectrophotometer (Perkin Elmer, LS55). The magnetic measurement of the nanocomposites was recorded using a VSM device (LBKFB model Meghnatis Daghigh Kavir Company). A Quanta chrome instrument was used to analyse the produced samples' surface area and pore volume using N_2 adsorption-desorption isotherm data at 77 K bath temperature (version 5.21). Thermo Scientific's Escalab 250Xi equipment has an X-ray source of Al Kα radiation capable of attaining ultrahigh vacuum (∼10−7 mbar) utilized to measure the XPS. TGA-DSC data were collected from room temperature (25°C) to 800°C with a heating rate of 2 °C per minute while under compressed air flow by using STA6000 Perkin Elmer.

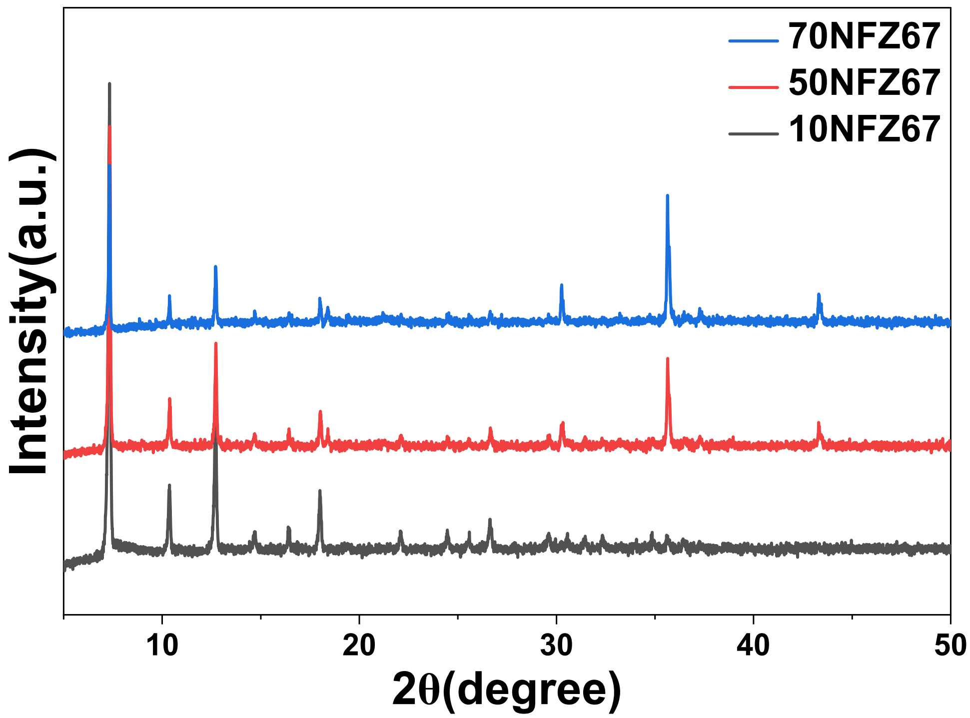
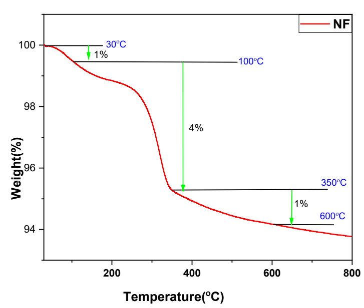
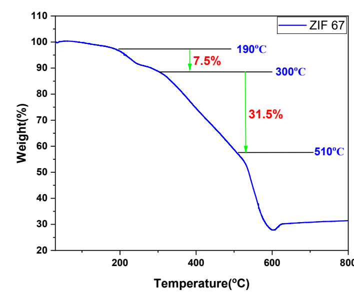


Figure S1:PXRD Pattern of 10NFZ67, 50NFZ67, 70NFZ67





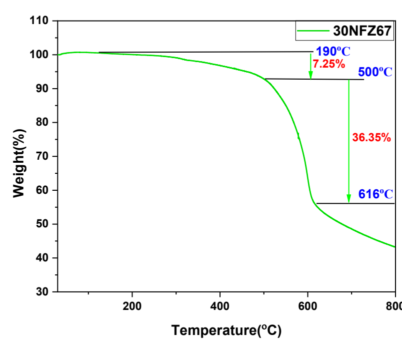


Figure S2: TGA of ZIF 67, NF, 30NFZ67

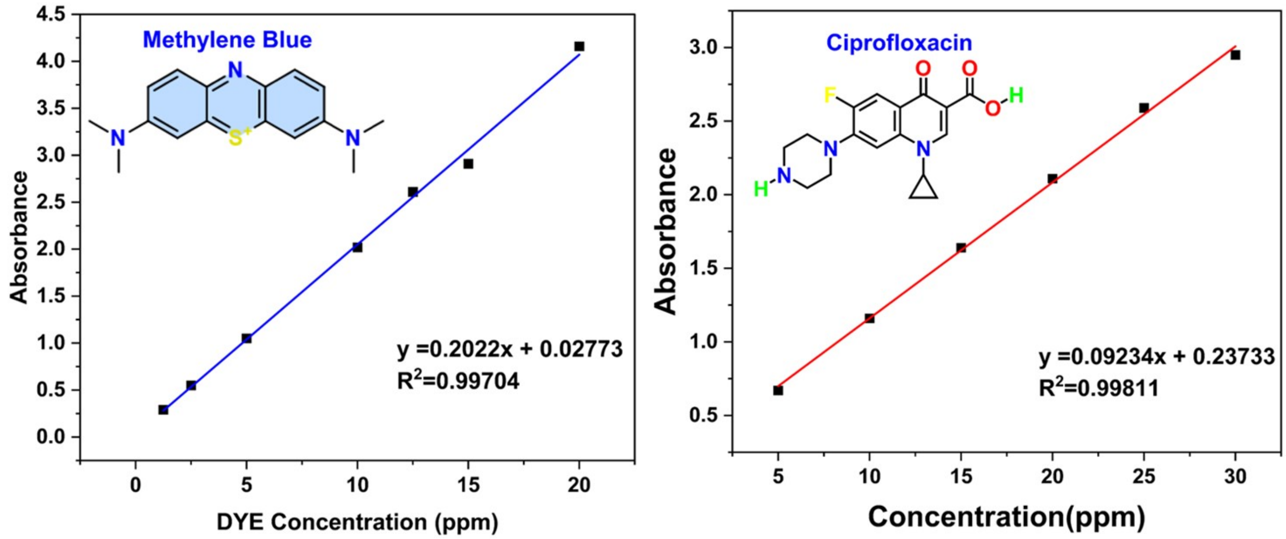
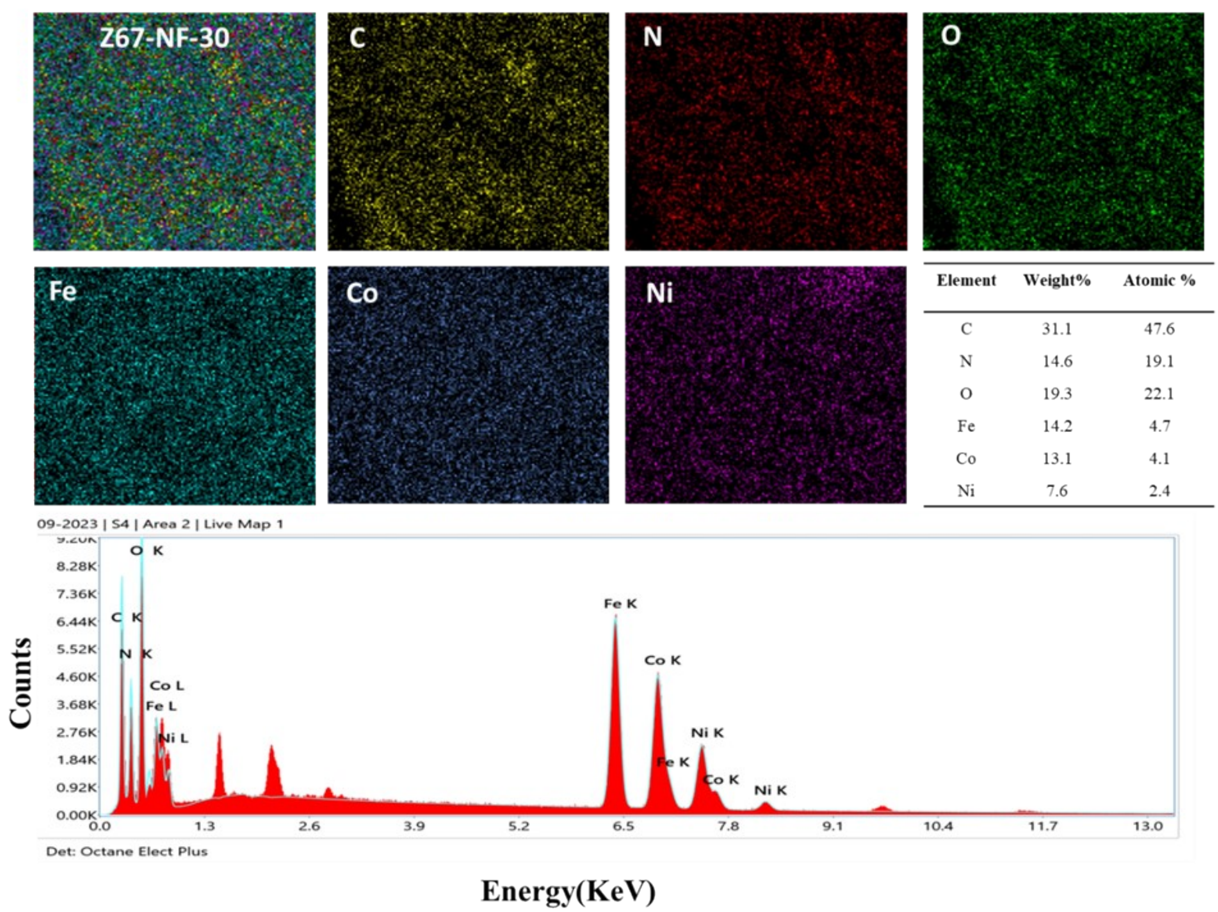


Figure S3: Calibration Curve for MB and CIP



Element	Weight%	Atomic %
C	31.1	47.6
N	14.6	19.1
O	19.3	22.1
Fe	14.2	4.7
Co	13.1	4.1
Ni	7.6	2.4

Figure S4: EDAX and elemental mapping of 30NFZ67

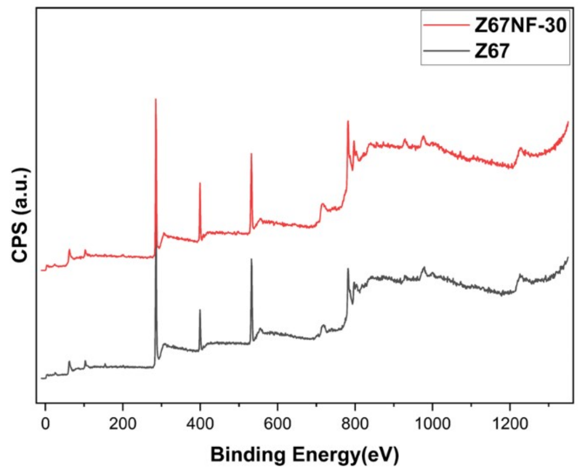
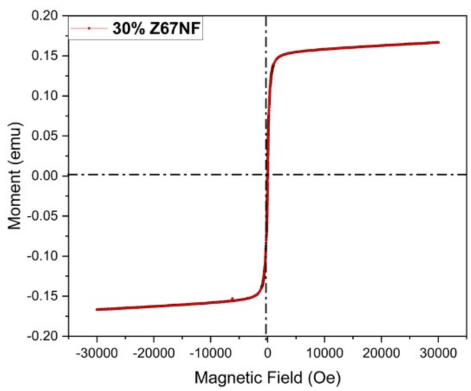


Figure S5: XPS Survey of ZIF 67 and 30NFZ67



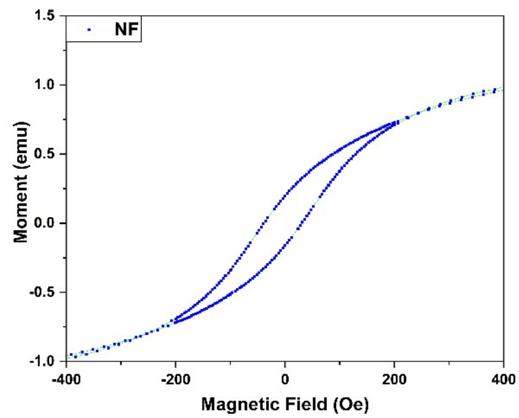
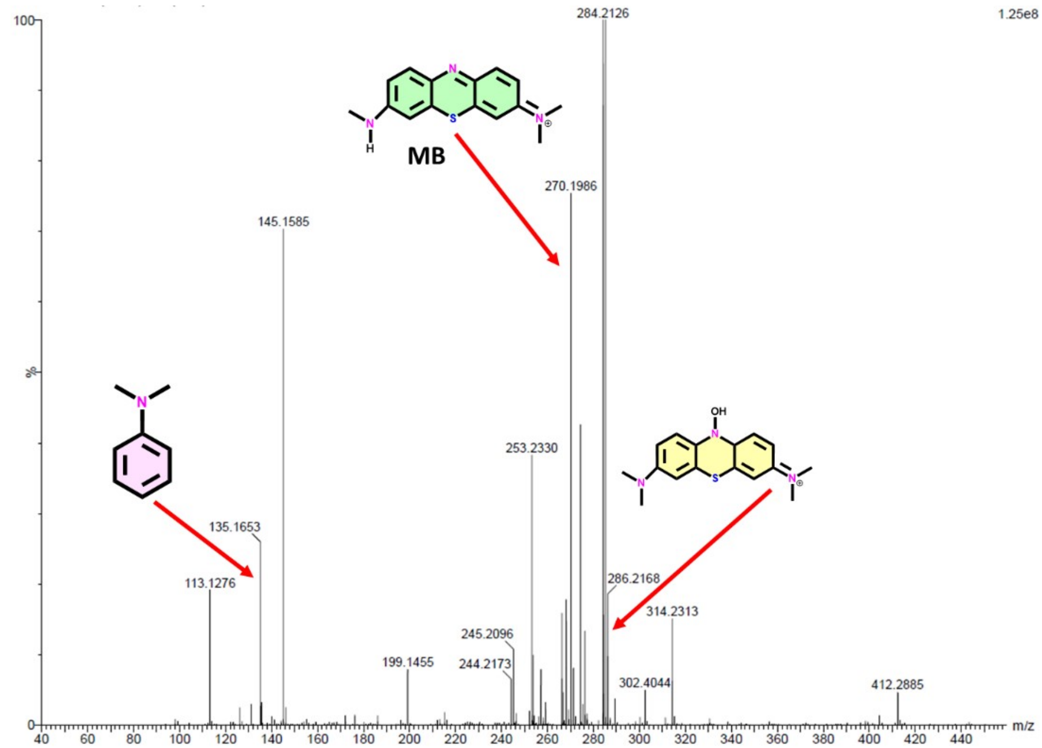


Figure S6:VSM data of 30NFZ67(full scale) and NF



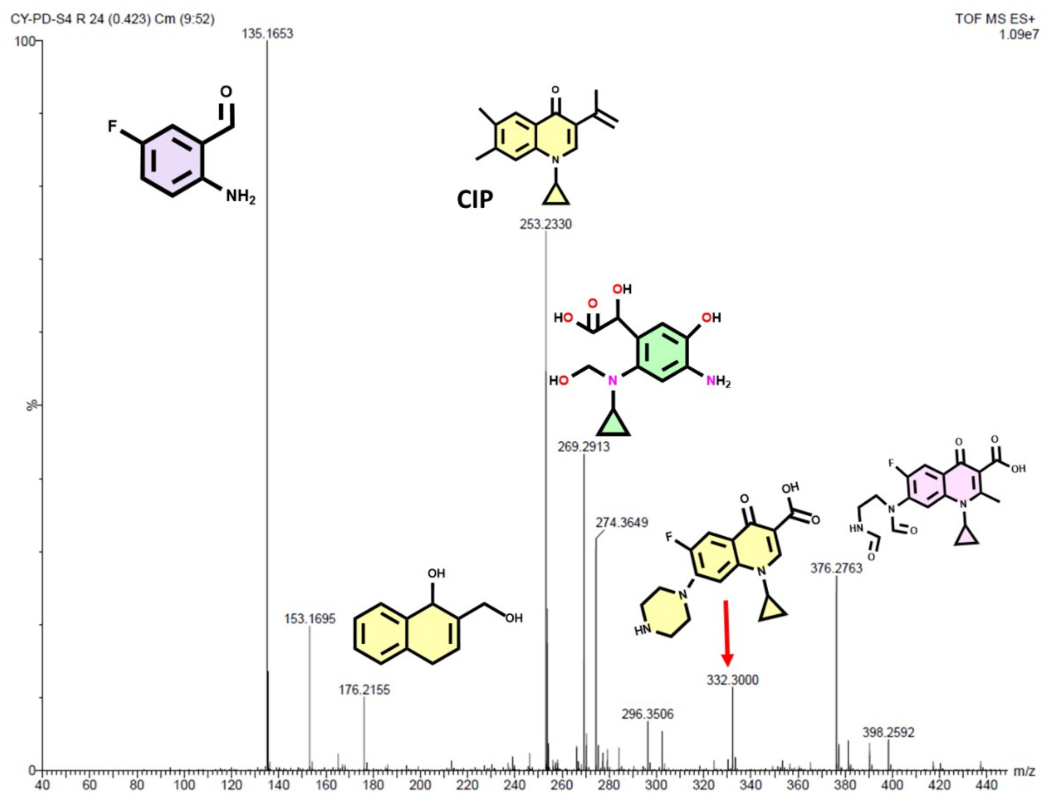


Figure S7:LC MS spectra and possible products of MB and CIP

Table S1: Detailed comparison of MOF/Ferrite hybrid synthesis method, solvent used.

MOF/$NiFe_2O_4$	**Synthesis method**	**Solvent**	**Condition**	**Ref.**
Ni MOF/$NiFe_2O_4$	Solvothermal	DMF	170 °C for 12 h, NaOH	[1]
NiFe-MOF/$NiFe_2O_4$	Solvothermal	DMF	180 °C for 24 h	[2]
$MgFe_2O_4$@UiO-66(Zr)	Solvothermal	DMF	140°C for 24 h	[3]
$\{H_3PW_{12}O_{40}\}$/MIL-88A(Fe)/MIL-88B(Fe)/NFO	Solvothermal	DMF	110 °C for 12 h.	[4]
ZIF 8/$NiFe_2O_4$	Room Temperature	Methanol	Stirred for 2hr.	[5]
$NiFe_2O_4$/ZIF 67 (30NFZ67)	Room temperature	Methanol	Stirred for 6hr.	**This work**

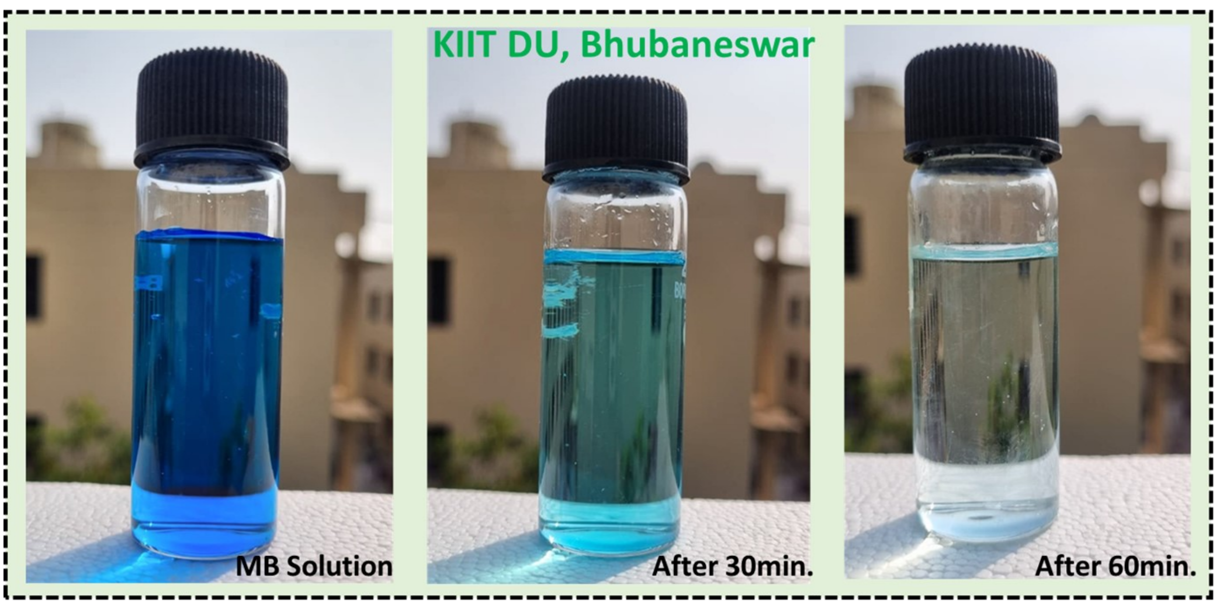


Figure S8: Visual representation of MB dye solution over time

Table S2: A list of ferrite based MOF heterostructures for the degradation of organic pollutants and their stability

Catalyst	Organic Pollutant(s)	Time	Degradation Efficiency	Energy Source / Activation	Recyclability	Ref.
ZIF-8/$NiFe_2O_4$	Methylene Blue	120 min	94%	Visible light (500 W halogen lamp)	4 cycles	[5]
ZIF-67/$MnFe_2O_4$	TCH (tetracycline hydrochloride)	15 min	82.6%	PMS-activated	4 cycles	[6]
$ZrFe_2O_4$@ZIF-8	Dopamine & sulfamethoxazole	120 min	100%	Visible light	10 cycles	[7]
VFe_2O_4@mono-ZIF-8	Ciprofloxacin, ampicillin, erythromycin	160 min	100%	Visible light (150 W Xe lamp)	10 cycles	[8]
ZIF-67/$Bi_{25}FeO_{40}$	Ofloxacin	60 min	95.5%	Visible light	5 cycles	[9]
$CuFe_2O_4$/ZIF-67	Methylene Blue	30 min	98.9%	PMS-activated	4 cycles	[10]
MIL-101(Cr)/$CoFe_2O_4$	RhB & Methyl Orange	140 min	96% (RhB); 88% (MO)	Ultrasound irradiation	4 cycles	[11]
MIL-101 (Fe)/$CoFe_2O_4$	Tetracycline	40 min	83%	Visible light PMS-Activated	5 cycles	[12]
30NFZ67 ($NiFe_2O_4$@ZIF-67)	Methylene Blue & Ciprofloxacin	60 min	~98% (MB), ~88% (CIP)	Sunlight	20 cycles	**This work**

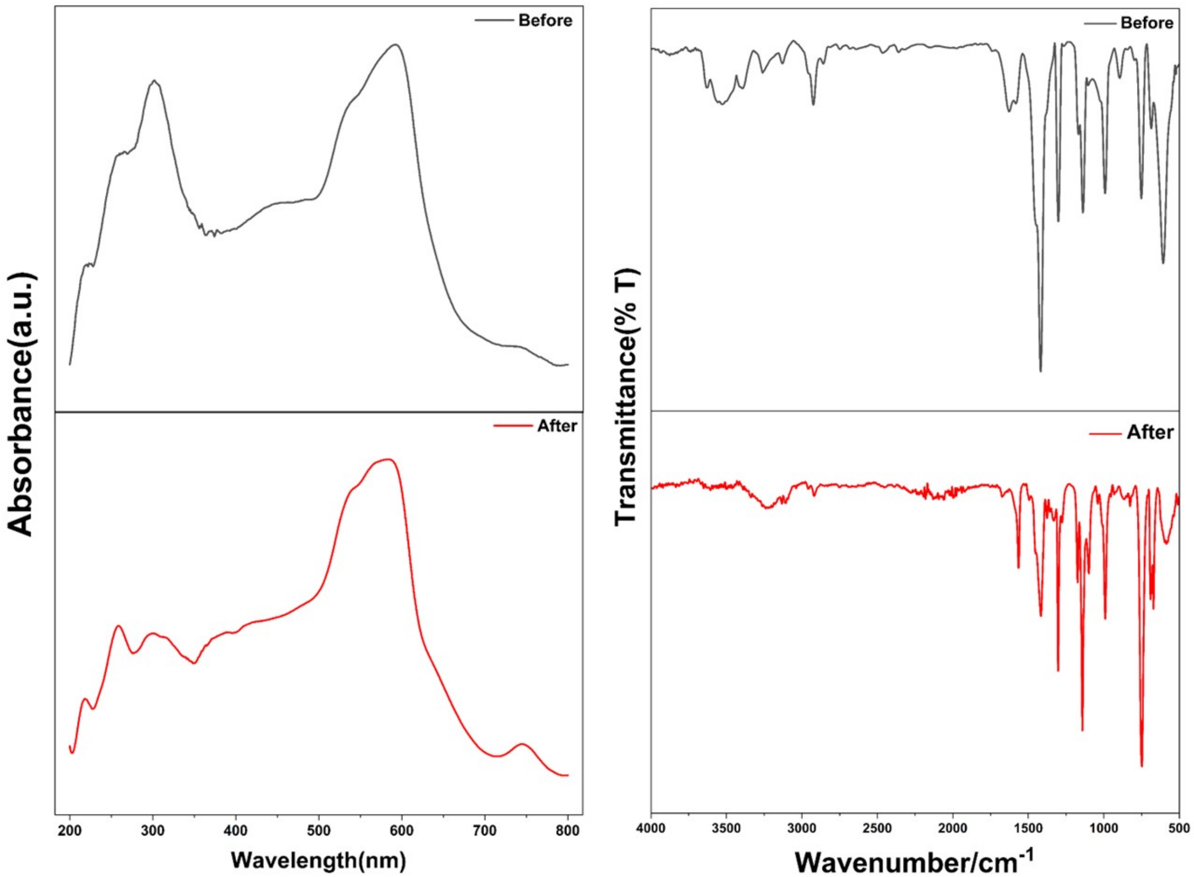


Figure S9: UV-DRS & FTIR graph of 30NFZ67 catalyst before and after the recyclability study (after 20th Cycle)

Figure S10: 30NFZ67 catalyst before and after the recyclability study

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