Supporting information

1, 3-Disulfoimidazolium Chloronickellate Immobilized HZSM-5 Framework as Visible-Light-Induced Heterogeneous Photocatalyst for Advanced Oxidation Process

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IR crystallinity determination:

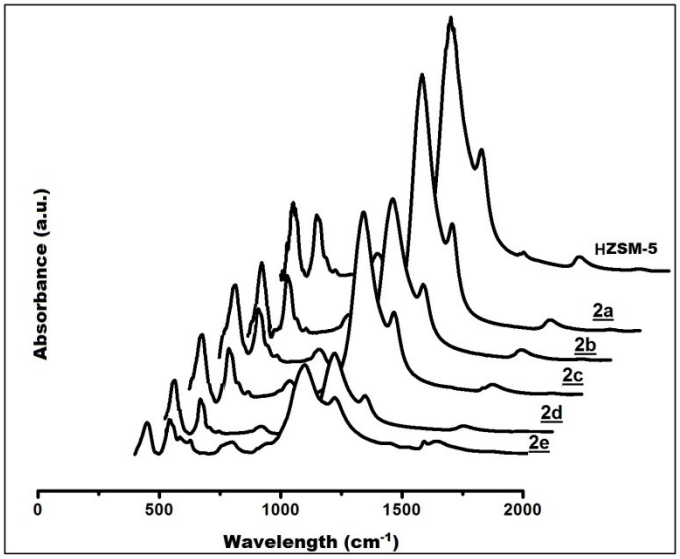

Fig.S1: IR absorbance spectra of **1**/HZSM-5 (**2a-2e)** with respect to parent HZSM-5 for optical density calculation

Table S1: Optical density calculation from IR absorbance spectra

Entry	Optical density ratio					
	HZSM-5	**2a**	**2b**	**2c**	**2d**	**2e**
1/HZSM-5	0.83	0.81	0.79	0.79	0.77	1.01

Optical density ratio=Absorbance at 556 cm^{-1}/Absorbance at 450 cm^{-1}

Table S2: Relative % crystallinity table for the hybrid materials

2θ (degree)	Relative % crystallinity					
	HZSM-5	**2a**	**2b**	**2c**	**2d**	**2e**
7.78	100	99.50	98.14	95.39	92.42	83.67
8.75	100	97.39	95.52	92.16	90.07	82.87
22.93	100	99.05	98.45	96.37	93.79	86.56
44.96	100	95.76	93.48	92.28	90.18	78.59

Table S3: Hammett acidity values of the hybrid materials of $[Dsim]_2[NiCl_4]$/HZSM-5

Entry	**A_{max}**	**[I]%**	**$[IH^+]$%**	**H^O**
Base	0.745	100	0	-
1	0.380	51.00	49.00	1.01
2a	0.187	25.10	74.90	0.51
2b	0.166	22.28	77.72	0.44
2c	0.152	20.40	79.60	0.39
2d	0.131	17.58	82.42	0.32
2e	0.094	12.61	87.39	0.15

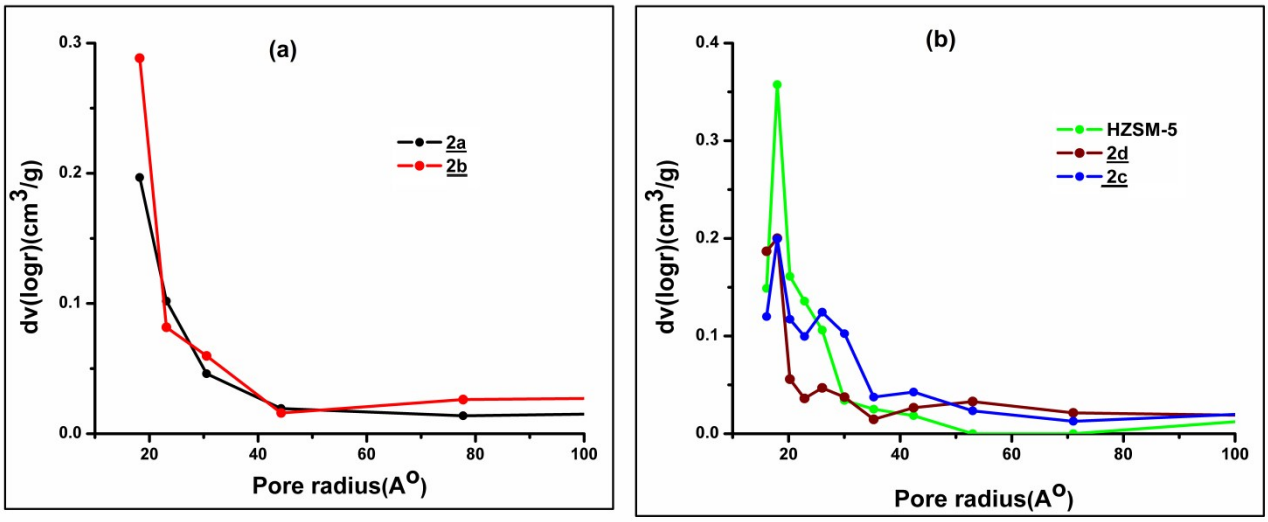

Fig.S2: BJH plots of **2a**-**2d** and HZSM-5

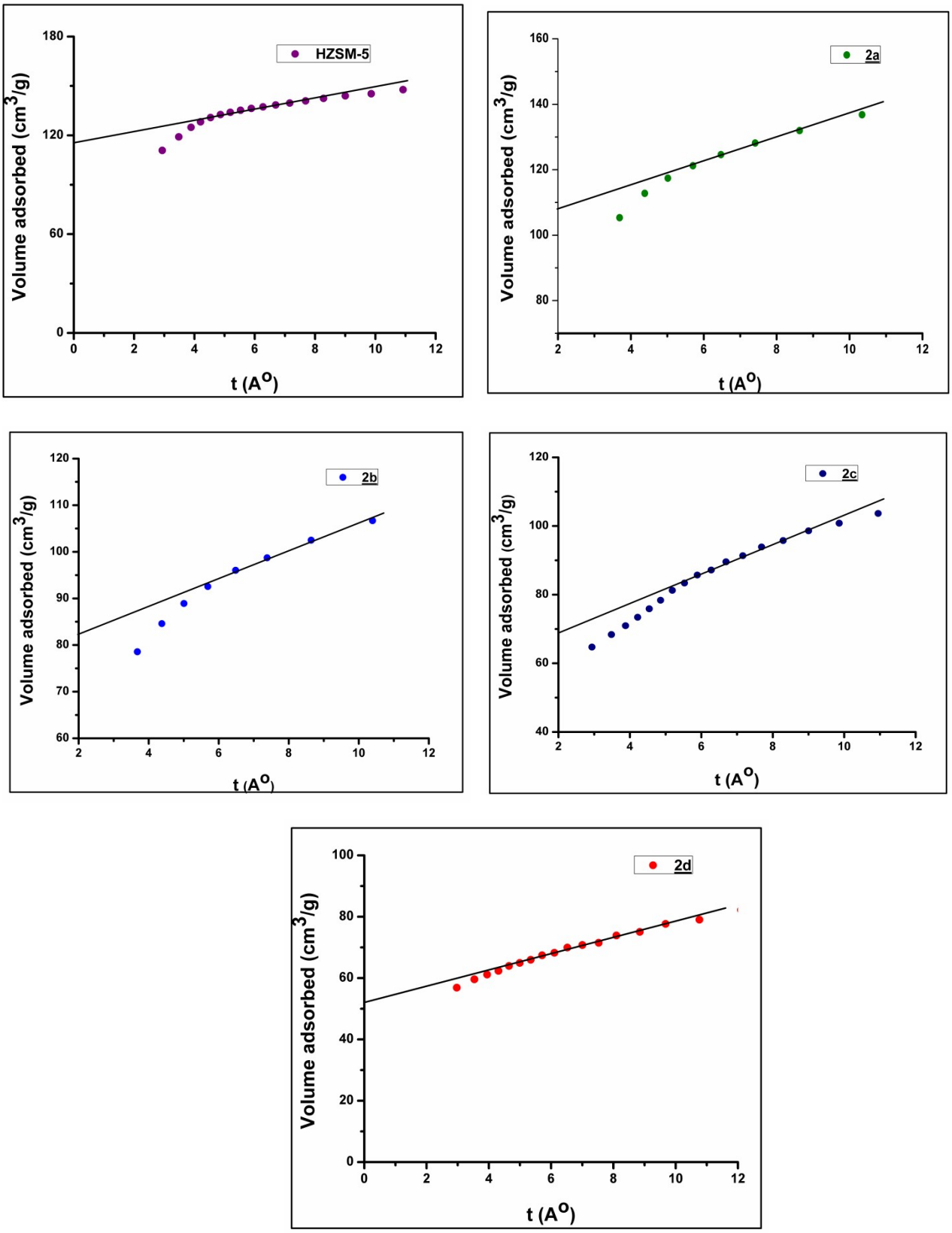

Fig.S3: t-Plots of HZSM-5, **2a**-**2d**

Table S4: MB dye degradation rate (%) with reaction time

Reaction time (min)	Degradation rate (%)[a,b] = (A_0-A_t/A_0)*100			
	2c		**2d**	
	A_t	(%)	A_t	(%)
5	2.42	35	2.41	35
10	1.39	63	1.94	48
15	0.48	87	1.37	63
20	0.10	97	0.93	75
25	-	-	0.46	88
30	-	-	0.28	92

[a]Degradation rate (%) were calculated using A_0 =3.72, [b] All the degradation rates are taken as approximate percentage values.

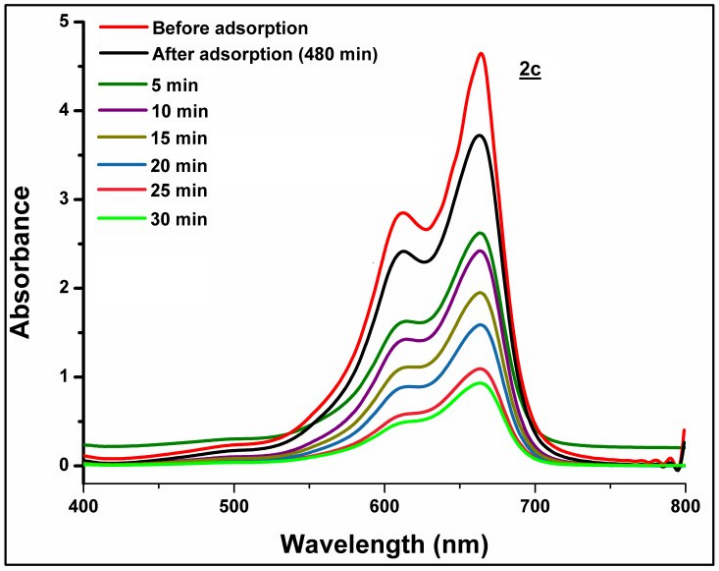

Fig.S4: MB degradation using 20 mg of**2c**

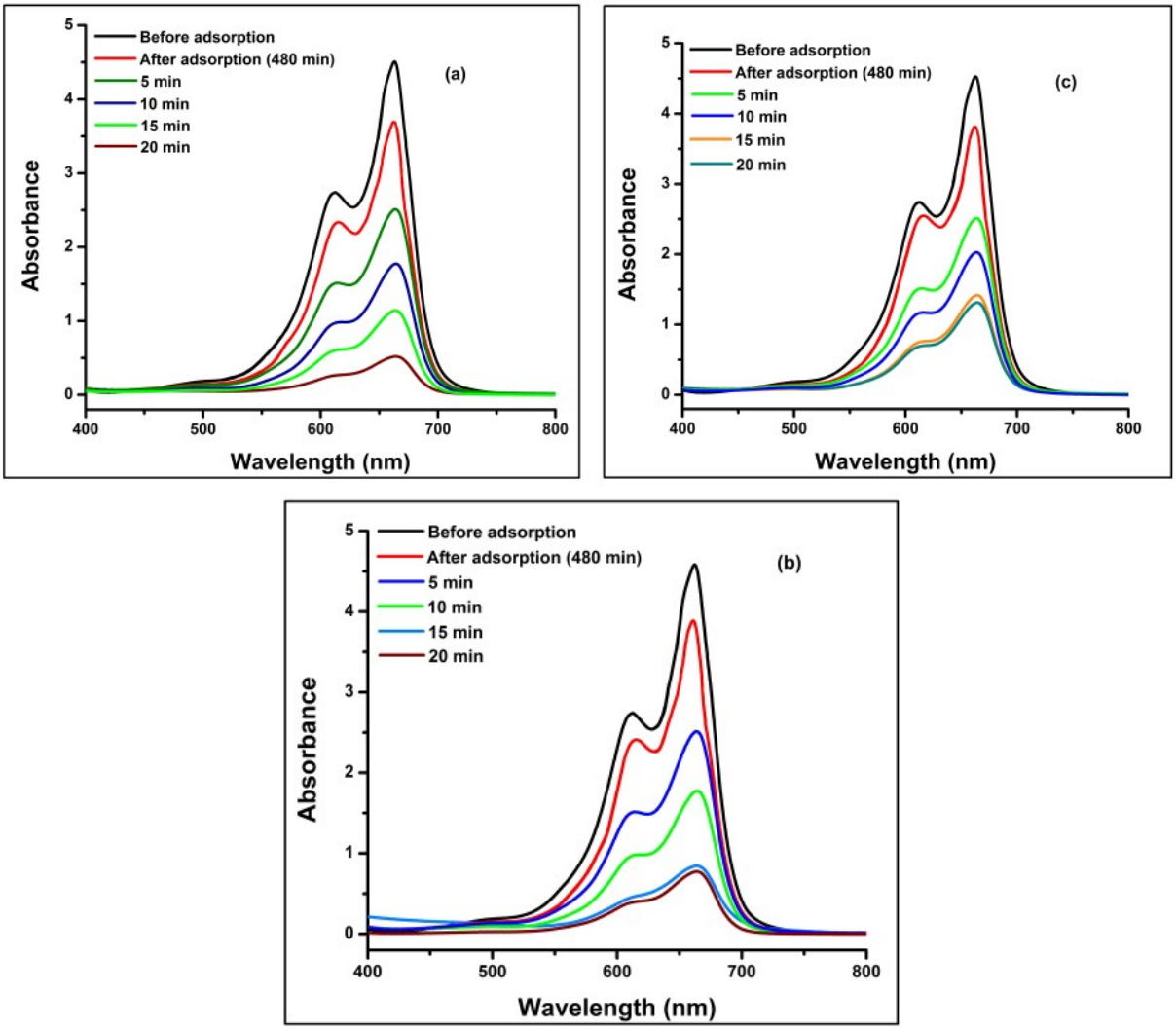

Fig.S5: UV-visible analysis of MB dye degradation by recycled catalyst **2c**

Table S5: Calculation of degradation rate (%)of methylene blue for recycled catalyst

Entry	**2c**[a]	
	A_t	%
1st recycle	0.47	87
2nd recycle	0.78	79
3rd recycle	1.35	65

[a]A_o= 3.74 (1st recycle), 3.82 (2nd recycle) and 3.91 (3rd recycle). All the degradation rates (%) were calculated using **Equation-4.**

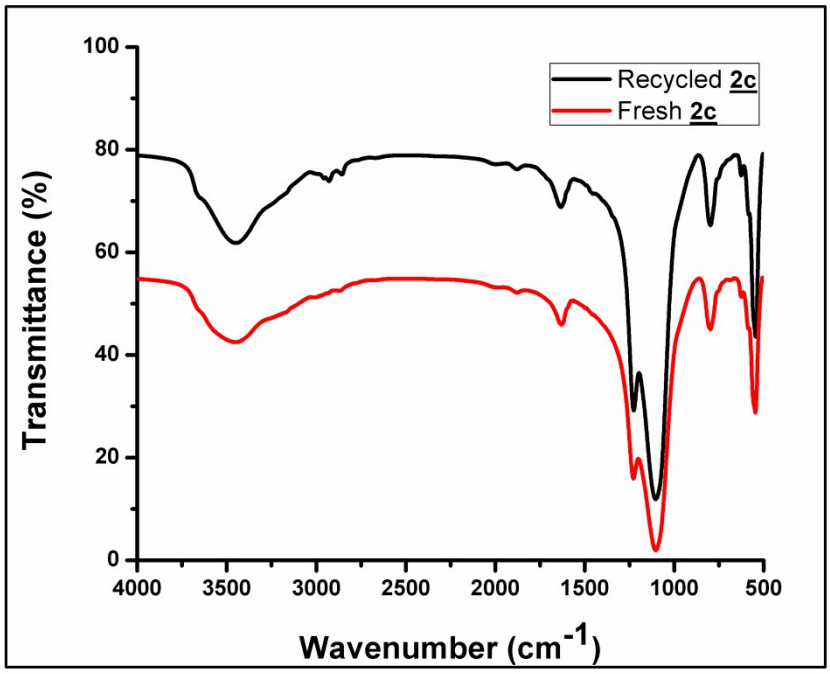

Fig.S6: FTIR spectra of recycled catalyst**2c**

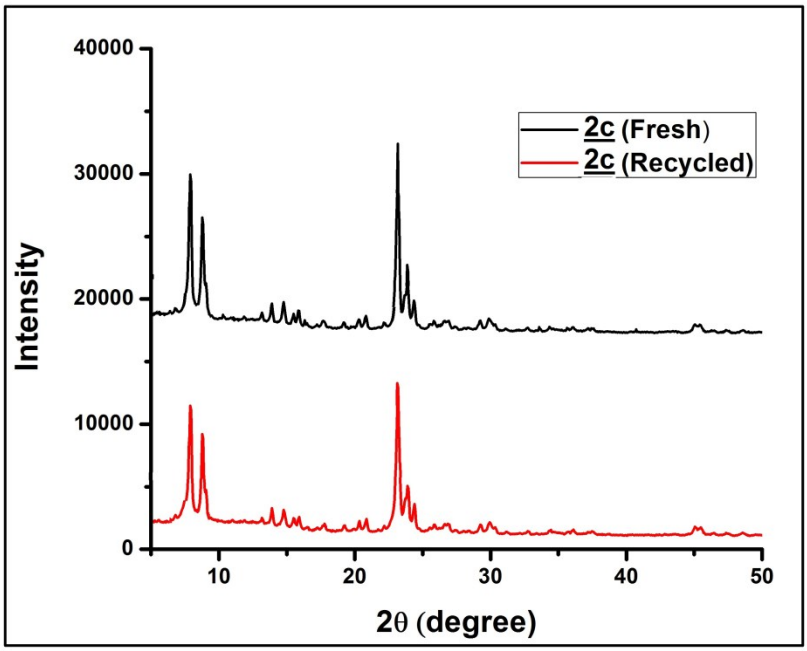

Fig.S7: PXRD pattern of **2c** (recycled) with the fresh **2c**