

1 **SUPPLEMENTARY DATA**

2 **Solar light driven Type II heterojunction TiO₂@ZIF-8 nanocomposite for**
3 **sustainable chlorpyrifos detoxification: physicochemical insights,**
4 **mineralization pathways and antibacterial performance**

5 Subhashree Mohanty, Bibeka nanda Marai, Sushanta Kumar Badamali*

6 *Department of Chemistry, Utkal University, Vani Vihar, Bhubaneswar-751004, Odisha, India*

7 *Corresponding author E-mail: skbuche@utkaluniversity.ac.in

8 ORCID no: 0000-0003-0526-0146

9 **S1**

10 **Table S1** The constraint for model optimization for the CP removal by TiO₂@ZIF-8

Name	Goal	Lower limit	Upper Limit	Lower weight	Upper weight	Importance
A:Concentration	Is in range	50	200	1	1	3
B:Adsorbent dose	Is in range	10	50	1	1	3
C: Time	Is in range	15	120	1	1	3
Degradation efficiency	none	80.8	90.01	1	1	3

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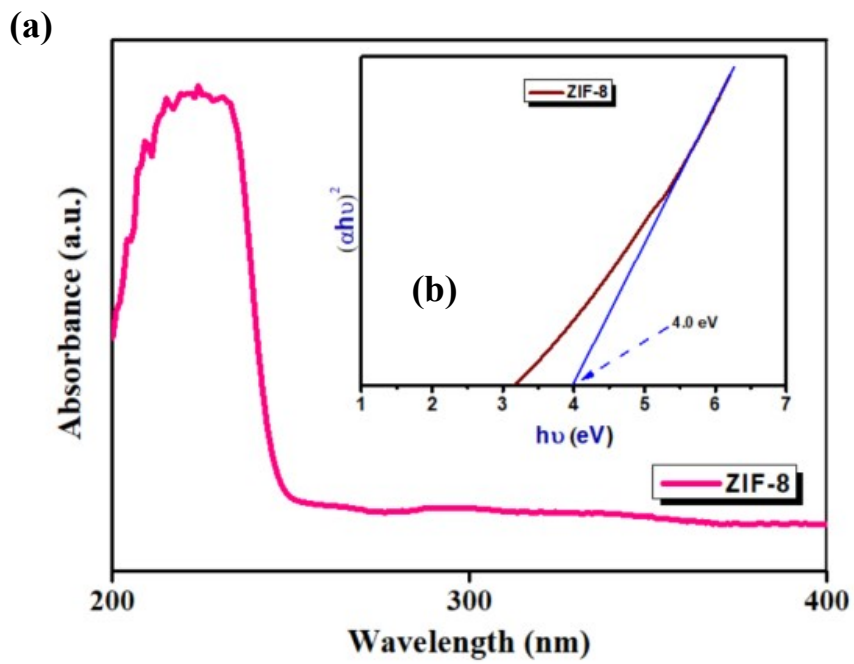
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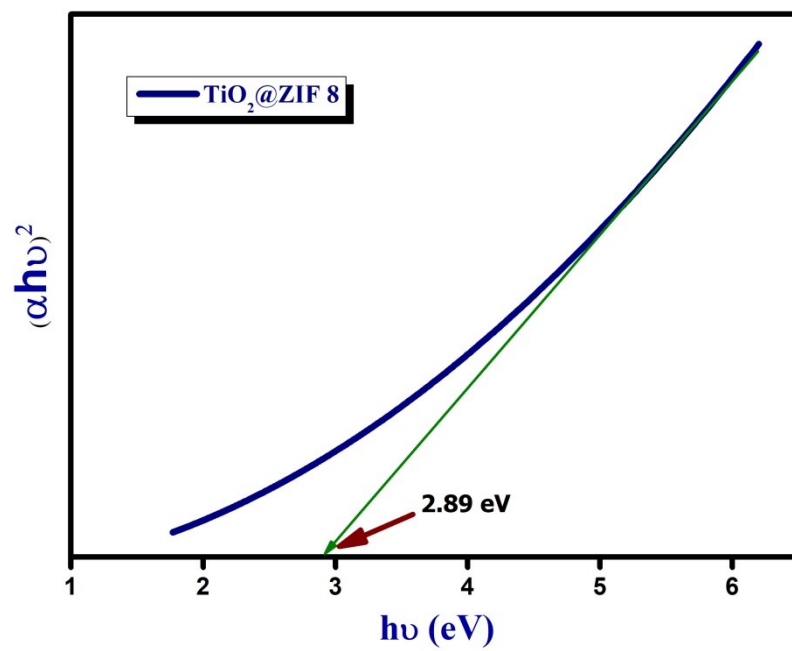
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(b)



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(c)

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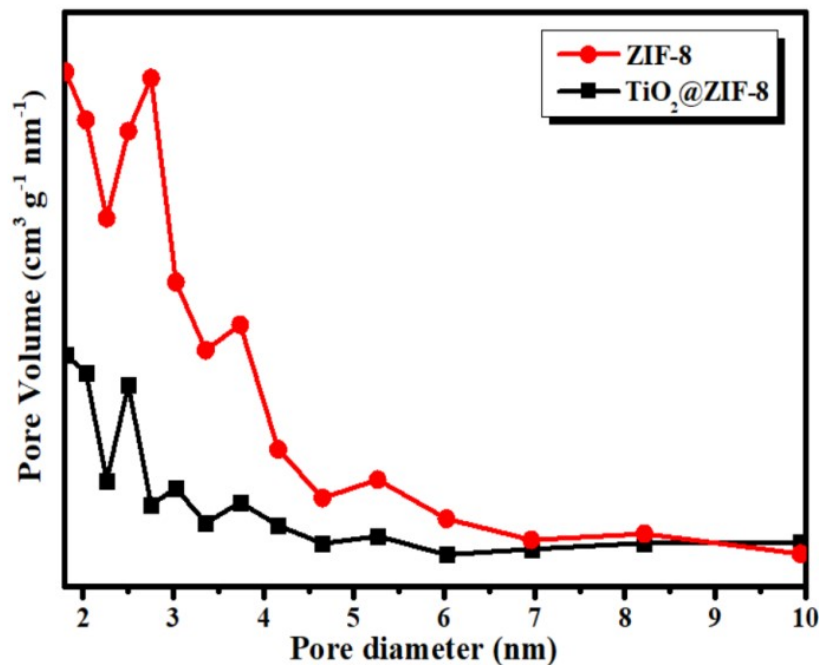
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62 **Figure S2** DR UV spectra and band gap of ZIF-8 (b) band gap of TiO₂@ZIF-8 (c) pore size
63 distribution curve of ZIF-8 and TiO₂@ZIF-8

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65 **Table S3** Fit summary

66 **Response 1: Degradation activity**

Source	Sequential p-value	Lack of Fit p-value	Adjusted R ²	Predicted R ²	
Linear	0.0002	< 0.0001	0.6834	0.4329	
2FI	0.1128	< 0.0001	0.7608	-0.2378	
Quadratic	< 0.0001	0.3850	1.0000	0.9998	Suggested
Cubic	0.3850		1.0000		Aliased

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73 **Table S4** ANOVA for Quadratic model74 **Response 1: Degradation activity of CP by TiO₂@ZIF-8**

Source	Sum of Squares	df	Mean Square	F-value	p-value
Model	105.95	9	11.77	1.181E+05	< 0.0001 significant
A-Concentration	10.75	1	10.75	1.079E+05	< 0.0001
B-Adsorbent dose	0.3041	1	0.3041	3051.52	< 0.0001
C-Time	39.77	1	39.77	3.990E+05	< 0.0001
AB	0.6050	1	0.6050	6070.51	< 0.0001
AC	9.52	1	9.52	95567.36	< 0.0001
BC	0.6844	1	0.6844	6867.70	< 0.0001
A ²	0.2785	1	0.2785	2794.20	< 0.0001
B ²	2.80	1	2.80	28083.65	< 0.0001
C ²	1.90	1	1.90	19044.50	< 0.0001
Residual	0.0008	8	0.0001		
Lack of Fit	0.0002	2	0.0001	1.12	0.3850 not significant
Pure Error	0.0006	6	0.0001		
Cor Total	105.95	17			

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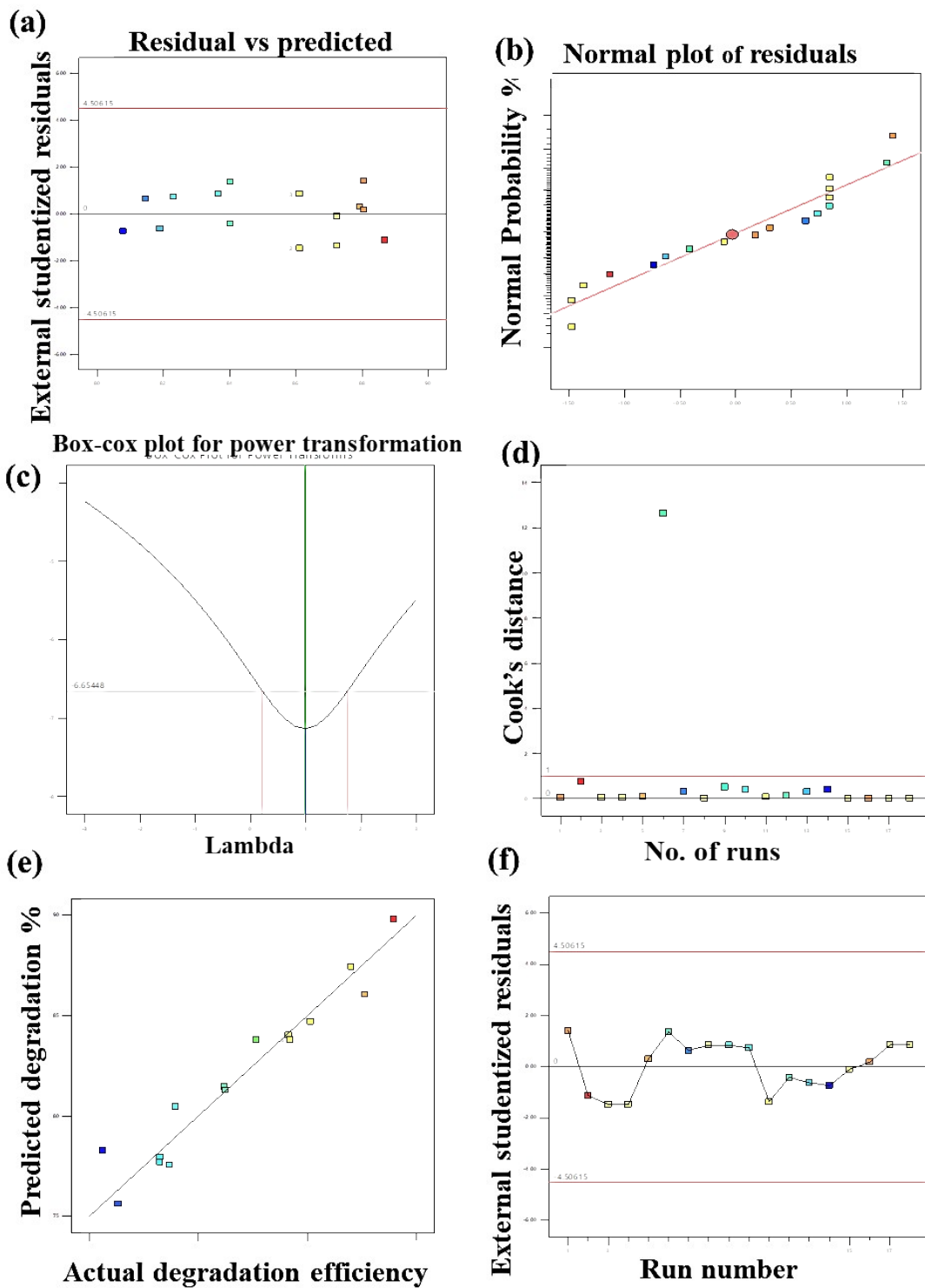
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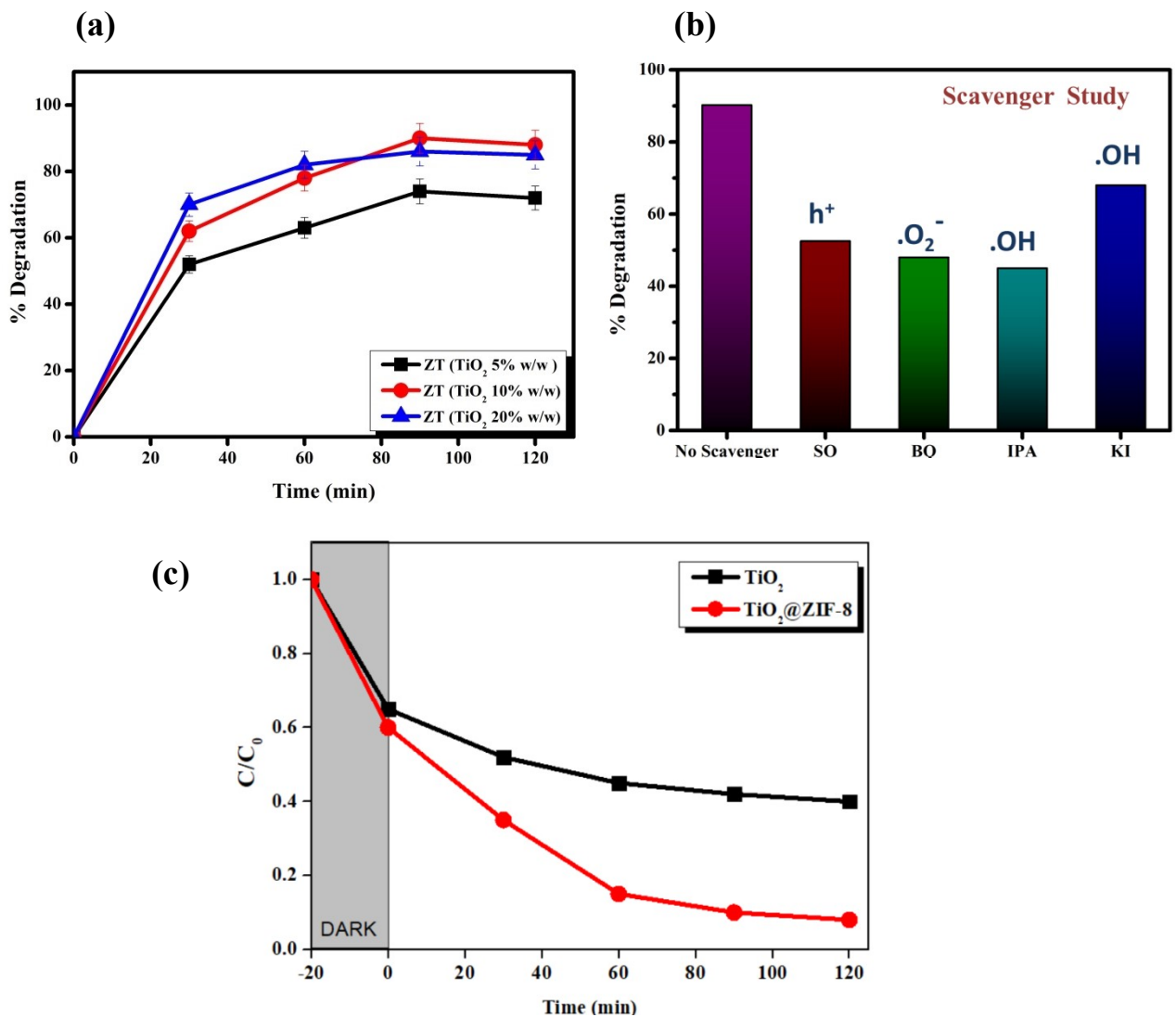
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97 **Figure S5** (a) externally studentized residuals versus predicted degradation efficiency, (b)
98 Normal plot of residuals, (c) Box-Cox plot (d) Cook's distance (e) predicted versus actual
99 degradation efficiency, and (f) externally studentized residuals versus run number

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112 **Figure S6** (a) Photocatalytic degradation of chlorpyrifos by TiO₂@ZIF-8 (ZT)(ZIF-8:TiO₂
 113 (5, 10, 20 % w/w) (b) scavenger study (TiO₂@ZIF-8; 30 mg, CP concentration;100 mg L⁻¹,
 114 Time; 120 min) (c) Photocatalytic activity by TiO₂ and TiO₂@ZIF-8

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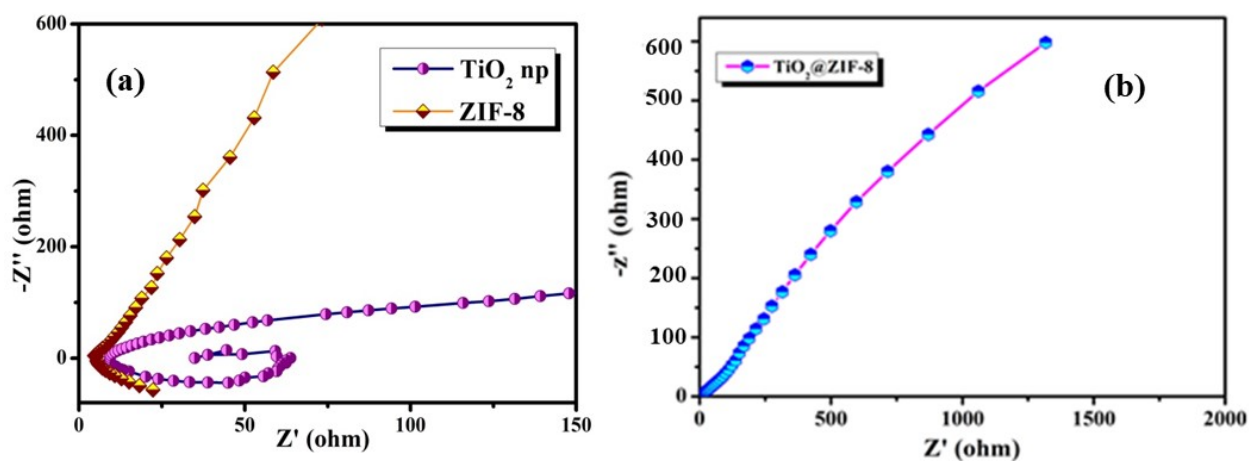
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123 Table S7 Rate constant with different concentration of CP

Sl. No.	CP conc. (mg L ⁻¹)	TiO ₂ @ZIF-8 (gL ⁻¹)	Rate constant (k, sec ⁻¹)	R ²
1	50	0.6	0.02813	0.971
2	100	0.6	0.02565	0.991
3	200	0.6	0.02682	0.982
4	250	0.6	0.02759	0.984

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133 Figure S8 EIS Nyquist plot of (a) ZIF-8 and TiO₂ np (b) TiO₂@ZIF-8

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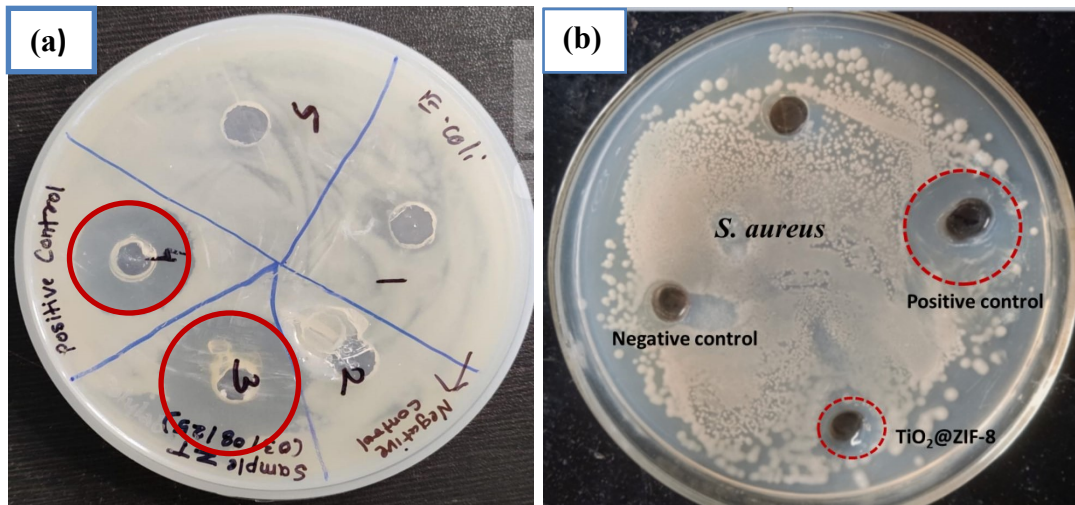
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150 **Figure S9** Antibacterial activity of TiO₂@ZIF-8 and ZIF-8 against (a) *E. Coli* and (b) *S.*

151 *Aureus*

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