

***Bi<sub>2</sub>WO<sub>6</sub>/Ag<sub>3</sub>PO<sub>4</sub>-Ag Z-scheme heterojunction as new plasmonic visible-light-driven photocatalyst: Performance evaluation and mechanism study***

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**Table S1.** Experimental factors and levels in the central composite design.

Factor	Name	Units	Minimum	Maximum	Coded	Values	Mean		
A	pH	-	3.00	9.00	4.50	7.50	6.00		
B	Photocatalyst mass	g	0.008	0.016	0.010	0.014	0.012		
C	Irradiation Time	min	60.00	120.00	75.00	105.00	90.0		
D	Concentration of MG	mg/L	4.00	12.00	6.00	10.00	8.00		
E	Concentration of AO	mg/L	2.00	6.00	3.00	5.00	4.00		
Run	A	B	C	D	E	Actual R% MG	Predicted R% MG	Actual R% AO	Predicted R% AO
1	4.5	0.010	75.0	6.0	3.0	88.99	88.68	90.19	90.05
2	6.0	0.012	90.0	8.0	4.0	87.62	86.89	82.32	81.91
3	6.0	0.012	90.0	8.0	2.0	92.32	92.55	98.49	98.59
4	6.0	0.016	90.0	8.0	4.0	96.8	97.03	94.66	94.76
5	9.0	0.012	90.0	8.0	4.0	97.64	97.87	98.5	98.60
6	4.5	0.014	75.0	10.0	5.0	90.91	90.75	91.4	91.33
7	6.0	0.012	90.0	8.0	6.0	65.49	65.72	53.57	53.67
8	7.5	0.014	75.0	6.0	5.0	87.53	87.37	93.01	92.94
9	6.0	0.012	90.0	8.0	4.0	86.56	86.89	81.14	81.91
10	6.0	0.008	90.0	8.0	4.0	80.62	80.85	66.76	66.86
11	6.0	0.012	90.0	4.0	4.0	93.47	93.70	94.13	94.23
12	7.5	0.010	75.0	10.0	5.0	89.54	89.38	90.88	90.81
13	6.0	0.012	90.0	8.0	4.0	87.25	86.89	82.44	81.91
14	7.5	0.010	105.0	6.0	5.0	96.36	96.20	95.64	95.57
15	6.0	0.012	60.0	8.0	4.0	73.18	73.41	73.75	73.85
16	4.5	0.010	105.0	10.0	5.0	59.71	59.55	65.4	65.33
17	7.5	0.010	105.0	10.0	3.0	97.17	97.01	91.39	91.32
18	6.0	0.012	120.0	8.0	4.0	94.27	94.50	93.71	93.81
19	7.5	0.014	75.0	10.0	3.0	80.08	79.92	81.54	81.47
20	7.5	0.014	105.0	6.0	3.0	69.06	68.90	68.52	68.45
21	6.0	0.012	90.0	12.0	4.0	65.50	65.73	84.64	84.74
22	6.0	0.012	90.0	8.0	4.0	86.95	86.89	81.62	81.91
23	4.5	0.014	105.0	6.0	5.0	79.13	78.97	66.02	65.95
24	4.5	0.014	105.0	10.0	3.0	75.58	75.42	89.49	89.42
25	3.0	0.012	90.0	8.0	4.0	79.38	79.61	79.71	79.81
26	6.0	0.012	90.0	8.0	4.0	86.54	86.89	82.22	81.91

**Table S2.** Sequential Model Sum of Squares for MG degradation.

<b>R% MG</b>						
<b>Sequential Model Sum of Squares</b>						
<b>Source</b>	<b>Sum of Squares</b>	<b>df</b>	<b>Mean Square</b>	<b>F Value</b>	<b>p-value Prob &gt; F</b>	
Mean	1.841E+005	1	1.841E+005			
Linear	644.09	5	128.82	1.16	0.3613	
2FI	1993.40	10	199.34	9.00	0.0009	
Quadratic	219.77	5	43.95	122.61	< 0.0001	Suggested
Cubic	0.94	1	0.94	4.40	0.1039	Aliased
Residual	0.85	4	0.21			
Total	1.869E+005	26	7189.57			
<b>Lack of Fit Tests</b>						
<b>Source</b>	<b>Sum of Squares</b>	<b>df</b>	<b>Mean Square</b>	<b>F Value</b>	<b>p-value Prob &gt; F</b>	
Linear	2214.10	16	138.38	648.67	< 0.0001	
2FI	220.70	6	36.78	172.43	< 0.0001	
Quadratic	0.94	1	0.94	4.40	0.1039	Suggested
Cubic	0.000	0				Aliased
Pure Error	0.85	4	0.21			
<b>Model Summary Statistics</b>						
<b>Source</b>	<b>Std. Dev.</b>	<b>R-Squared</b>	<b>Adjusted R-Squared</b>	<b>Predicted R-Squared</b>	<b>PRESS</b>	
Linear	10.52	0.2253	0.0316	-0.4563	4163.57	
2FI	4.71	0.9225	0.8063	-0.2081	3454.03	
Quadratic	0.60	0.9994	0.9969	0.8147	529.84	Suggested
Cubic	0.46	0.9997	0.9981		+	Aliased

**Table S3.** Methods used to select the appropriate model for analyzing of input data.

<b>R% AO</b>						
<b>Sequential Model Sum of Squares</b>						
<b>Source</b>	<b>Sum of Squares</b>	<b>df</b>	<b>Mean Square</b>	<b>F Value</b>	<b>p-value Prob &gt; F</b>	
Mean vs Total	1.813E+005	1	1.813E+005			
Linear vs Mean	741.03	5	148.21	1.09	0.3942	
2FI vs Linear	2428.15	10	242.82	8.63	0.0011	
Quadratic vs 2FI	279.91	5	55.98	200.50	< 0.0001	Suggested
Cubic vs Quadratic	0.18	1	0.18	0.60	0.4830	Aliased
Residual	1.21	4	0.30			
Total	1.848E+005	26	7105.86			
<b>Lack of Fit Tests</b>						
<b>Source</b>	<b>Sum of Squares</b>	<b>df</b>	<b>Mean Square</b>	<b>F Value</b>	<b>p-value Prob &gt; F</b>	
Linear	2708.24	16	169.27	557.31	< 0.0001	
2FI	280.09	6	46.68	153.70	0.0001	
Quadratic	0.18	1	0.18	0.60	0.4830	Suggested
Cubic	0.000	0				Aliased
Pure Error	1.21	4	0.30			
<b>Model Summary Statistics</b>						
<b>Source</b>	<b>Std. Dev.</b>	<b>R-Squared</b>	<b>Adjusted R-Squared</b>	<b>Predicted R-Squared</b>	<b>PRESS</b>	
Linear	11.64	0.2148	0.0185	-0.4884	5135.55	
2FI	5.30	0.9185	0.7962	-0.0763	3713.67	
Quadratic	0.53	0.9996	0.9980	0.9699	103.82	Suggested
Cubic	0.55	0.9996	0.9978		+	Aliased

**Table S4.** Analysis of variance (ANOVA) results for quadratic model of degradation process.

Source	df	R% of MG				R% of AO			
		Sum of Squares	Mean Square	F Value	p-value Prob > F	Sum of Squares	Mean Square	F Value	p-value Prob > F
Model	20	2857.25	142.86	398.54	< 0.0001	3449.09	172.45	617.66	< 0.0001
<i>A</i>	<i>1</i>	<i>166.71</i>	<i>166.71</i>	<i>465.08</i>	<i>&lt; 0.0001</i>	<i>176.53</i>	<i>176.53</i>	<i>632.27</i>	<i>&lt; 0.0001</i>
<i>B</i>	<i>1</i>	<i>130.90</i>	<i>130.90</i>	<i>365.16</i>	<i>&lt; 0.0001</i>	<i>389.20</i>	<i>389.20</i>	<i>1393.97</i>	<i>&lt; 0.0001</i>
<i>C</i>	<i>1</i>	<i>222.39</i>	<i>222.39</i>	<i>620.41</i>	<i>&lt; 0.0001</i>	<i>199.20</i>	<i>199.20</i>	<i>713.46</i>	<i>&lt; 0.0001</i>
<i>D</i>	<i>1</i>	<i>391.16</i>	<i>391.16</i>	<i>1091.21</i>	<i>&lt; 0.0001</i>	<i>45.03</i>	<i>45.03</i>	<i>161.28</i>	<i>&lt; 0.0001</i>
<i>E</i>	<i>1</i>	<i>359.92</i>	<i>359.92</i>	<i>1004.07</i>	<i>&lt; 0.0001</i>	<i>1008.90</i>	<i>1008.90</i>	<i>3613.48</i>	<i>&lt; 0.0001</i>
<i>AB</i>	<i>1</i>	<i>388.47</i>	<i>388.47</i>	<i>1083.70</i>	<i>&lt; 0.0001</i>	<i>433.35</i>	<i>433.35</i>	<i>1552.08</i>	<i>&lt; 0.0001</i>
<i>AC</i>	<i>1</i>	<i>100.77</i>	<i>100.77</i>	<i>281.11</i>	<i>&lt; 0.0001</i>	<i>130.35</i>	<i>130.35</i>	<i>466.88</i>	<i>&lt; 0.0001</i>
<i>AD</i>	<i>1</i>	<i>209.62</i>	<i>209.62</i>	<i>584.78</i>	<i>&lt; 0.0001</i>	<i>35.30</i>	<i>35.30</i>	<i>126.43</i>	<i>&lt; 0.0001</i>
<i>AE</i>	<i>1</i>	<i>289.34</i>	<i>289.34</i>	<i>807.18</i>	<i>&lt; 0.0001</i>	<i>869.47</i>	<i>869.47</i>	<i>3114.09</i>	<i>&lt; 0.0001</i>
<i>BC</i>	<i>1</i>	<i>726.33</i>	<i>726.33</i>	<i>2026.21</i>	<i>&lt; 0.0001</i>	<i>907.22</i>	<i>907.22</i>	<i>3249.29</i>	<i>&lt; 0.0001</i>
<i>BD</i>	<i>1</i>	<i>37.55</i>	<i>37.55</i>	<i>104.76</i>	<i>0.0002</i>	<i>1.24</i>	<i>1.24</i>	<i>4.43</i>	<i>0.0891</i>
<i>BE</i>	<i>1</i>	<i>113.78</i>	<i>113.78</i>	<i>317.42</i>	<i>&lt; 0.0001</i>	<i>141.56</i>	<i>141.56</i>	<i>507.01</i>	<i>&lt; 0.0001</i>
<i>CD</i>	<i>1</i>	<i>6.90</i>	<i>6.90</i>	<i>19.25</i>	<i>0.0071</i>	<i>7.11</i>	<i>7.11</i>	<i>25.47</i>	<i>0.0039</i>
<i>CE</i>	<i>1</i>	<i>3.57</i>	<i>3.57</i>	<i>9.97</i>	<i>0.0252</i>	<i>22.99</i>	<i>22.99</i>	<i>82.35</i>	<i>0.0003</i>
<i>DE</i>	<i>1</i>	<i>527.89</i>	<i>527.89</i>	<i>1472.64</i>	<i>&lt; 0.0001</i>	<i>775.26</i>	<i>775.26</i>	<i>2776.65</i>	<i>&lt; 0.0001</i>
<i>A</i> <sup>2</sup>	<i>1</i>	<i>5.88</i>	<i>5.88</i>	<i>16.41</i>	<i>0.0098</i>	<i>91.15</i>	<i>91.15</i>	<i>326.47</i>	<i>&lt; 0.0001</i>
<i>B</i> <sup>2</sup>	<i>1</i>	<i>7.22</i>	<i>7.22</i>	<i>20.14</i>	<i>0.0065</i>	<i>2.04</i>	<i>2.04</i>	<i>7.32</i>	<i>0.0425</i>
<i>C</i> <sup>2</sup>	<i>1</i>	<i>14.68</i>	<i>14.68</i>	<i>40.95</i>	<i>0.0014</i>	<i>6.35</i>	<i>6.35</i>	<i>22.73</i>	<i>0.0050</i>
<i>D</i> <sup>2</sup>	<i>1</i>	<i>87.90</i>	<i>87.90</i>	<i>245.22</i>	<i>&lt; 0.0001</i>	<i>98.28</i>	<i>98.28</i>	<i>351.99</i>	<i>&lt; 0.0001</i>
<i>E</i> <sup>2</sup>	<i>1</i>	<i>102.70</i>	<i>102.70</i>	<i>286.50</i>	<i>&lt; 0.0001</i>	<i>57.00</i>	<i>57.00</i>	<i>204.13</i>	<i>&lt; 0.0001</i>
Residual	5	1.79	0.36			1.40	0.28		
<i>Lack of Fit</i>	<i>1</i>	<i>0.94</i>	<i>0.94</i>	<i>4.40</i>	<i>0.1039</i>	<i>0.18</i>	<i>0.18</i>	<i>0.60</i>	<i>0.4830</i>
<i>Pure Error</i>	<i>4</i>	<i>0.85</i>	<i>0.21</i>			<i>1.21</i>	<i>0.30</i>		
Cor Total	25	2859.05				3450.49			

**Table S5.** Statistical supplementary results of quadratic model.

	<b>R% AO</b>	<b>R% MG</b>
<b>Std. Dev.</b>	0.60	0.53
<b>Mean</b>	84.14	83.51
<b>C.V. %</b>	0.71	0.63
<b>PRESS</b>	529.84	103.82
<b>-2 Log Likelihood</b>	4.25	-2.25
<b>R-Squared</b>	0.9994	0.9996
<b>Adj R-Squared</b>	0.9969	0.9980
<b>Pred R-Squared</b>	0.8147	0.9699
<b>Adeq Precision</b>	71.219	94.613
<b>BIC</b>	72.67	66.17
<b>AICc</b>	277.25	270.75