

Supporting Information

Synthesis, Characterization and Photocatalytic activity of Guar Gum-g- Aliginate@Silver Bionanocomposite Material

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Table S1. Design Table including experimental and predicted response

Factor 1	Factor 2	Factor 3	Factor 4	Experimental Response 1	Predicted Response
Time	pH	Conc	Dose	R1	
min		mg/L	(g)	mg/g	mg/g
60	3	100	0.07	17.74	17.21
140	3	100	0.07	21.39	23.06
60	7	100	0.07	12.75	12.96
140	7	100	0.07	17.05	18.25
60	3	200	0.07	23.13	21.00
140	3	200	0.07	26.45	27.73
60	7	200	0.07	20.85	20.27
140	7	200	0.07	26.93	26.44
60	3	100	0.12	13.47	13.74
140	3	100	0.12	15.83	17.61
60	7	100	0.12	12.91	12.83
140	7	100	0.12	14.23	16.14
60	3	200	0.12	11.25	11.24
140	3	200	0.12	16.42	15.99
60	7	200	0.12	15.74	13.85
140	7	200	0.12	16.33	18.05
20	5	150	0.095	12.55	15.41
180	5	150	0.095	29.29	25.46
100	1	150	0.095	9.76	9.30
100	9	150	0.095	7.62	7.11
100	5	50	0.095	19.6	16.88
100	5	250	0.095	20.83	22.58
100	5	150	0.045	28.98	29.16
100	5	150	0.145	18.44	17.29
100	5	150	0.095	28.16	28.24
100	5	150	0.095	28.22	28.24
100	5	150	0.095	28.34	28.24
100	5	150	0.095	28.29	28.24
100	5	150	0.095	28.24	28.24
100	5	150	0.095	28.21	28.24

Table S2: Range of the variable parameters

Variable	Unit	-2	Low factorial (-1)	Center (0)	High factorial (+1)	+2
Exposure Time	(min)	20	60	100	140	180
pH		1	3	5	7	9
Catalyst Dose	(g)	0.045	0.07	0.095	0.12	0.145
MB Concentration	(mg L ⁻¹)	50	100	150	200	250

Table S3. Coefficient T and P value table

Factor	Coefficient Estimate	Standard Error	T-Value	P-Value	VIF
Intercept	28.24	0.82	14.43	0.000	
A-Time	2.51	0.41	1.04	0.313	1.00
B-pH	-0.55	0.41	-1.18	0.256	1.00
C-Conc	1.42	0.41	3.38	0.004	1.00
D-Dose	-2.97	0.41	-3.75	0.002	1.00
AB	-0.14	0.50	-1.08	0.295	1.00
AC	0.22	0.50	1.59	0.132	1.00
AD	-0.49	0.50	-1.06	0.303	1.00
BC	0.88	0.50	0.16	0.877	1.00
BD	0.84	0.50	1.96	0.067	1.00
CD	-1.57	0.50	-2.05	0.058	1.00
A²	-1.95	0.38	-2.99	0.009	1.05
B²	-5.01	0.38	-4.57	0.000	1.05
C²	-2.13	0.38	-0.08	0.937	1.05
D²	-1.25	0.38	-2.32	0.034	1.05

Table S4. Non-linear kinetic data for photodegradation of MB onto GG-Alg@Ag bionanocomposite

Model	Parameters	Values
Pseudo First Order	Q _m exp (mg g ⁻¹)	30.73
	Q _m cal (mg g ⁻¹)	29.63
	K ₁ (min ⁻¹)	0.15
	R ²	0.74
	χ ²	5.12
	SSE	0.92
Pseudo Second Order	Q _m exp (mg g ⁻¹)	30.73
	Q _m cal (mg g ⁻¹)	31.07
	K ₂ (g mg ⁻¹ min ⁻¹)	8.72×10 ⁻³
	R ²	0.95
	χ ²	0.99
	SSE	0.48

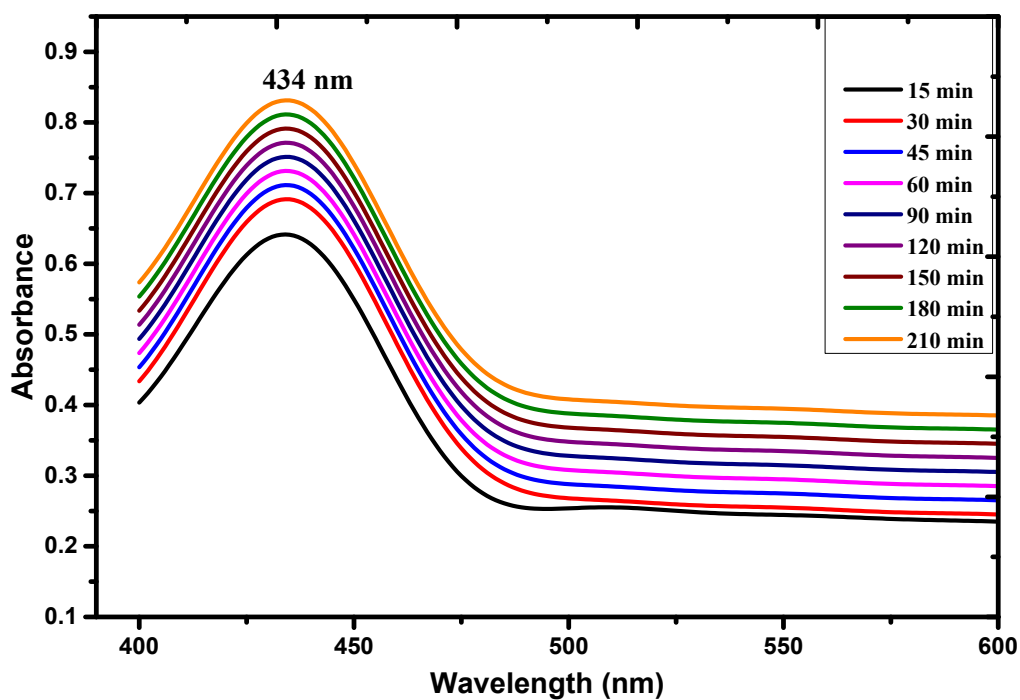


Figure S1. Time-dependent UV-VIS plot to observe the nucleation of GG-Alg@Ag bionanocomposite

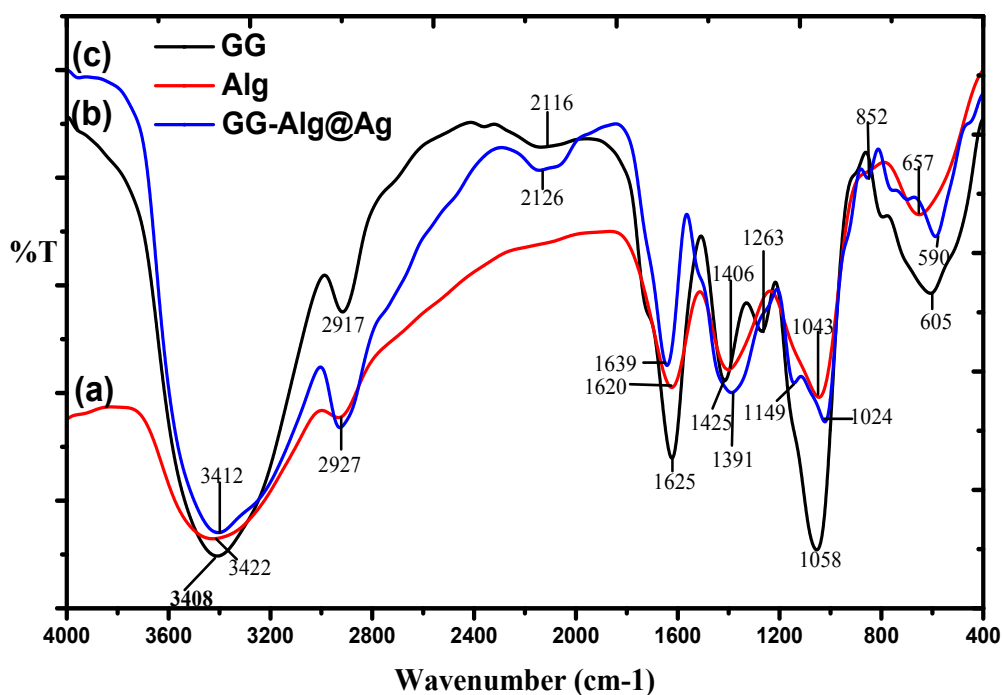


Figure S2. FTIR spectra of (a) alginate (red line) (b) guar gum (black line) and (c) GG-Alg@Ag (blue line)

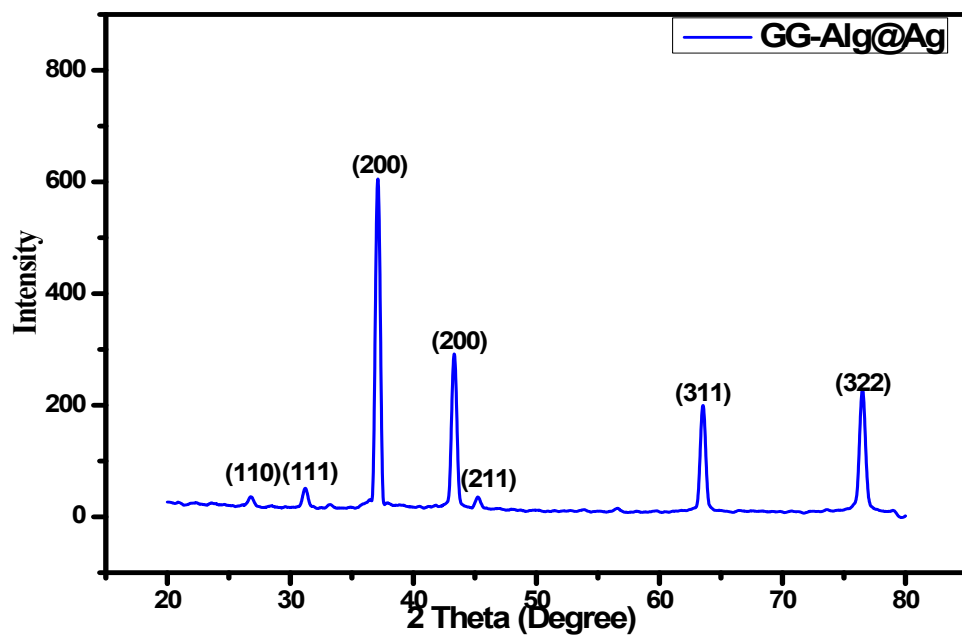


Figure S3. XRD patterns of GG-Alg@Ag bionanocomposite

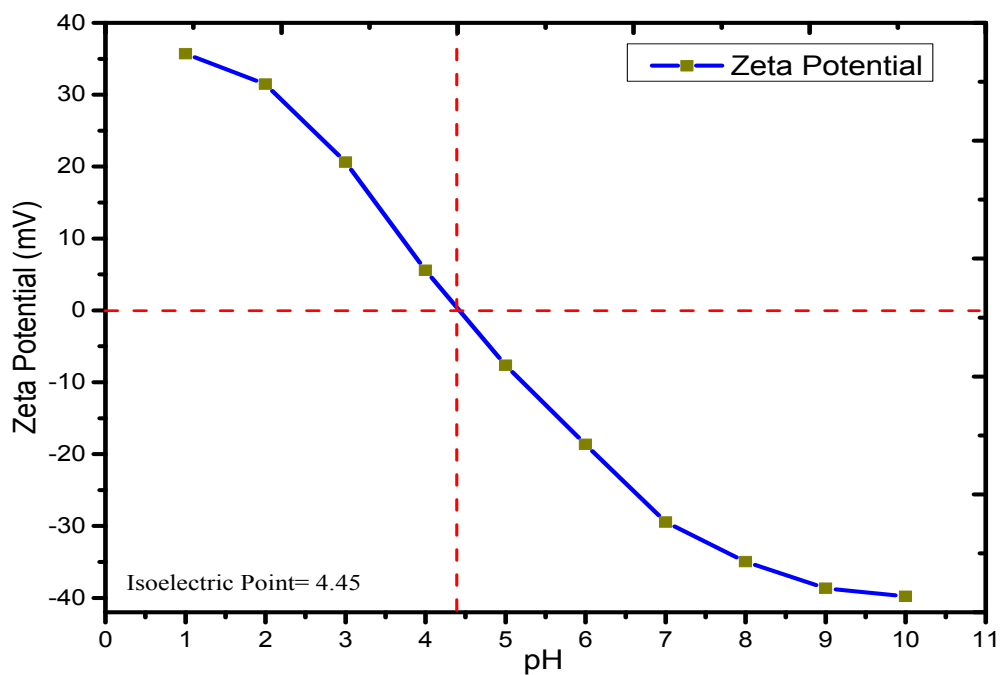


Figure S4. Zeta Potential variation curve for GG-Alg@Ag bionanocomposite with pH

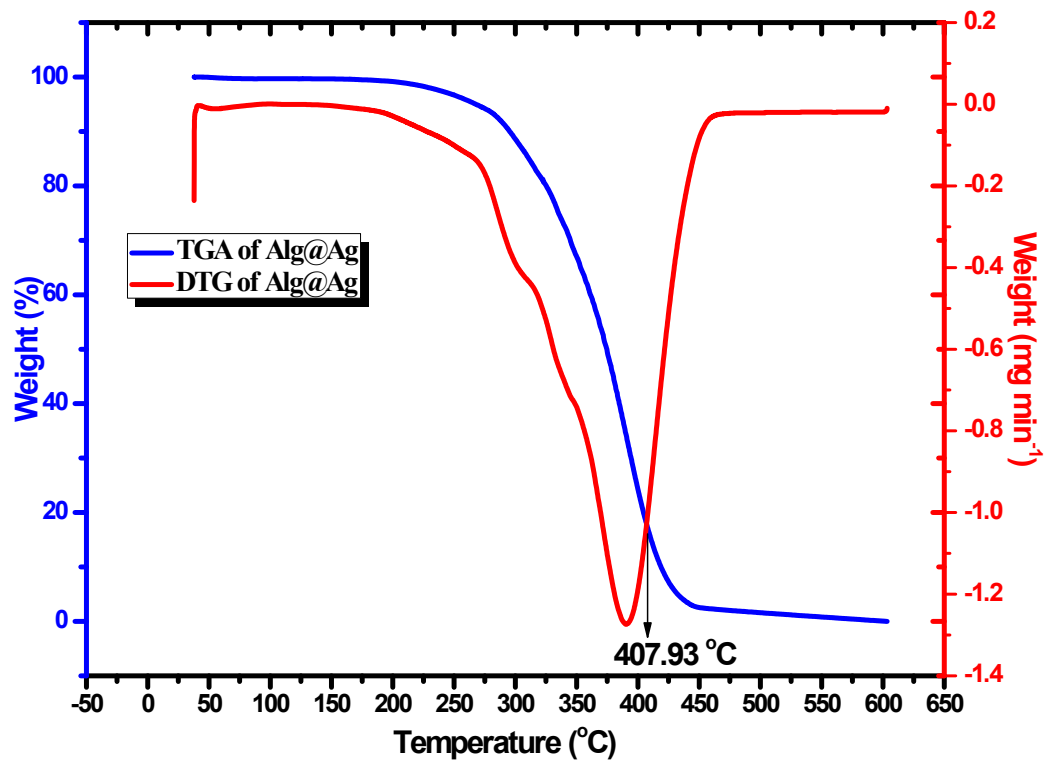


Figure S5. TGA and DTG thermogram of GG-Alg@Ag bionanocomposite