

Supplementary Information

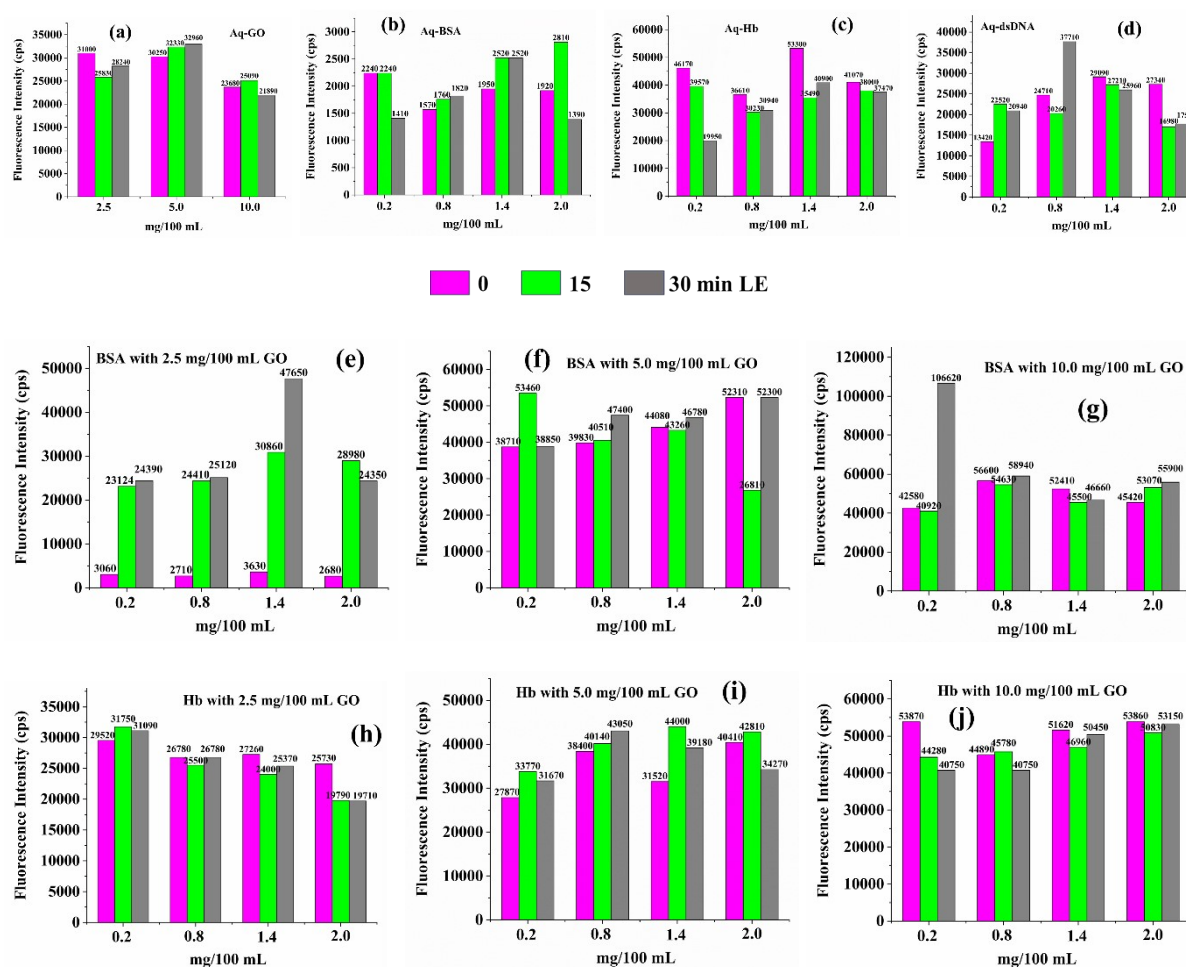
Interaction mechanism of BSA, Hb, and dsDNA with Graphene Oxide after Visible Light Exposures: In Vitro Physicochemical Properties and Multi Spectroscopic Insights

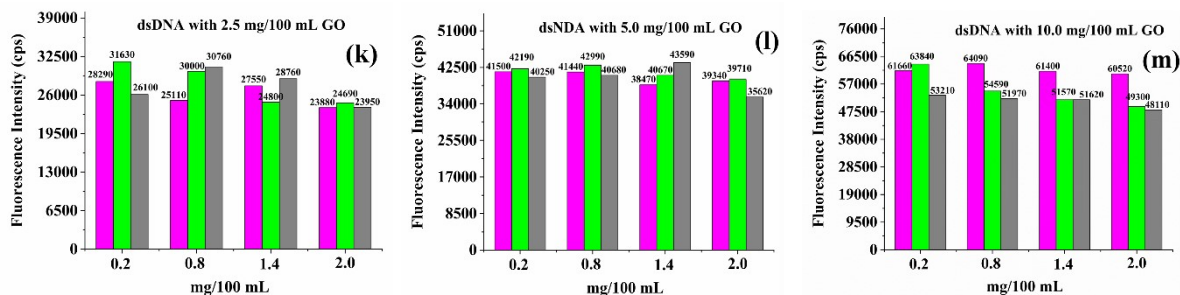
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Figure S1. Fluorescence intensity vs mg/100 mL for (a) GO (b) BSA (c) Hb (d) dsDNA, BSA with (e) 2.5 (f) 5.0 (g) 10.0, Hb with (h) 2.5 (i) 5.0 (j) 10.0, dsDNA with (k) 2.5 (l) 5.0 (m) 10.0 mg/100 mL GO.





Tables

Table S1. Primary data of aq-GO at 310.15 K.

gm/100 mL	ρ	η	γ	V_2	ϕ	R_h	$k_{s\phi}$	σ
0 min LE								
0.0025	0.993349	0.6906	72.19	6.2127	-0.0004	-4.0433	4.3362	0.00957
0.0050	0.993368	0.6948	72.19	6.2126	0.0020	5.4227	4.3363	0.00962
0.0100	0.993405	0.6957	72.19	6.2125	0.0025	4.6443	4.3373	0.00964
15 min								
0.0025	0.993346	0.6950	72.19	6.2133	0.0022	6.9954	4.33543	0.00963
0.0050	0.993370	0.6934	72.19	6.2132	0.0012	4.5630	4.33715	0.00961
0.0100	0.993403	0.6952	72.19	6.2130	0.0023	4.4713	4.33769	0.00963
30 min								
0.0025	0.993351	0.6935	72.19	6.2133	0.0013	5.8996	4.3352	0.00961
0.0050	0.993371	0.6898	72.19	6.2132	-0.0008	-4.0634	4.3366	0.00956
0.0100	0.993403	0.6948	72.19	6.2130	0.0020	4.3067	4.3376	0.00962

Units: ρ (10^3 kgm^{-3}), η ($10^{-3} \text{ kgm}^{-1}\text{s}^{-1}$), γ (mNm^{-1}), V_2 ($10^2 \text{ m}^3\text{mol}^{-1}$), ϕ ($10^{-6} \text{ m}^3\text{mol}^{-1}$), R_h (nm), $k_{s\phi}$ ($10^{-10} \text{ m}^4\text{kg}^{-1}\text{s}^{-1}$), σ (sm^{-1})

Table S2. Primary data of aq-BSA at 310.15 K.

gm/100 mL	ρ	η	γ	V_2	ϕ	R_h	$k_{s\phi}$	σ
0 min								
0.0002	0.993314	0.6817	71.06	66444.25	-0.0055	-22.2139	4.3372	0.00959
0.0008	0.993317	0.6815	71.06	66444.05	-0.0056	-14.0964	4.3377	0.00959
0.0014	0.993325	0.6824	71.62	66443.51	-0.0052	-11.3437	4.3354	0.00953
0.0020	0.993315	0.6817	71.62	66444.18	-0.0055	-10.3233	4.3374	0.00952
15 min								
0.0002	0.993342	0.6850	71.06	66442.37	-0.0036	-19.3300	4.3371	0.00964
0.0008	0.993347	0.6909	71.62	66442.04	-0.0002	-4.7846	4.3399	0.00965
0.0014	0.993346	0.6824	71.62	66442.11	-0.0051	-11.3224	4.3366	0.00953
0.0020	0.993334	0.6853	71.06	66442.91	-0.0035	-8.8200	4.3367	0.00964
30 min								
0.0002	0.993343	0.6840	71.62	66442.31	-0.0042	-20.2670	4.33630	0.00955
0.0008	0.993345	0.6806	71.62	66442.17	-0.0062	-14.5520	4.33697	0.00950
0.0014	0.993358	0.6849	71.06	66441.30	-0.0037	-10.1370	4.34045	0.00964
0.0020	0.993353	0.6835	71.62	66441.64	-0.0045	-9.6296	4.33904	0.00954

Table S3. Primary data of aq-Hb at 310.15 K.

gm/100 mL	ρ	η	γ	V_2	ϕ	R_h	$k_{s\phi}$	σ
0 min								
0.0002	0.993331	0.6929	72.75	64910.91	0.0009	12.1495	4.3340	0.00952
0.0008	0.993334	0.6932	72.75	64924.94	0.0011	8.1033	4.3350	0.00953
0.0014	0.993335	0.6929	72.75	64927.81	0.0009	6.4036	4.3346	0.00952
0.0020	0.993323	0.6958	72.75	64933.88	0.0026	8.0395	4.3349	0.00956
15 min								
0.0002	0.993338	0.6949	72.75	64932.58	0.0021	15.9866	4.3374	0.00955

0.0008	0.993352	0.6952	72.75	64931.67	0.0023	10.3781	4.3379	0.00956
0.0014	0.993342	0.6955	72.75	64932.32	0.0024	8.8410	4.3358	0.00956
0.0020	0.993346	0.6958	72.75	64932.06	0.0026	8.0490	4.3367	0.00956
30 min								
0.0002	0.993336	0.6958	72.75	64932.71	0.0026	17.3322	4.3356	0.00956
0.0008	0.993333	0.6941	72.75	64932.91	0.0016	9.2915	4.3347	0.00954
0.0014	0.993342	0.6942	72.75	64932.32	0.0017	7.8146	4.3361	0.00954
0.0020	0.993347	0.6965	72.75	64931.99	0.0030	8.3978	4.3365	0.00957

Table S4. Primary data of aq-dsDNA at 310.15 K.

gm/100 mL	ρ	η	γ	V_2	ϕ	R_h	$k_{s\phi}$	σ
0 min								
0.0002	0.993333	0.6999	72.18	130840.67	0.0050	21.4624	4.3362	0.00970
0.0008	0.993340	0.7497	73.33	130852.49	0.0338	25.5855	4.3353	0.01022
0.0014	0.993343	0.8026	71.62	130857.56	0.0644	26.3274	4.3354	0.01121
0.0020	0.993346	0.8456	71.62	130859.35	0.0893	26.0625	4.3364	0.01181
15 min								
0.0002	0.993337	0.7009	72.18	130872.00	0.0055	22.2438	4.3363	0.00971
0.0008	0.993341	0.7538	72.75	130871.47	0.0362	26.1721	4.3360	0.01036
0.0014	0.993341	0.8107	72.18	130871.47	0.0691	26.9489	4.3358	0.01123
0.0020	0.993349	0.8362	72.18	130870.42	0.0839	25.5261	4.3366	0.01159
30 min								
0.0002	0.993338	0.6999	72.18	130871.87	0.0050	21.4653	4.3358	0.00970
0.0008	0.993343	0.7503	72.75	130871.21	0.0341	25.6698	4.3360	0.01031
0.0014	0.993338	0.8074	72.18	130871.87	0.0672	26.7024	4.3357	0.01119
0.0020	0.993348	0.8344	72.75	130870.55	0.0828	25.4156	4.3363	0.01147

Units: ρ (10^3 kg m^{-3}), η ($10^{-3} \text{ kg m}^{-1} \text{ s}^{-1}$), γ (m Nm^{-1}), V_2 ($10^{-6} \text{ m}^3 \text{ mol}^{-1}$), ϕ ($10^{-6} \text{ m}^3 \text{ mol}^{-1}$), R_h (nm), $k_{s\phi}$ ($10^{-10} \text{ m}^4 \text{ kg}^{-1} \text{ s}^{-1}$), σ (sm^{-1})

Table S5. Primary data of BSA with 2.5 mg/100 mL GO at 310.15 K.

gm/100 mL	ρ	η	γ	V_2	ϕ	R_h (nm)	$k_{s\phi}$	σ
0 min								
0.0002	0.993351	0.6937	71.63	66441.77	0.0018	15.27	4.3377E-07	0.00969
0.0008	0.993348	0.6939	72.19	66441.97	0.0019	9.80	4.3362E-07	0.00961
0.0014	0.993335	0.7217	72.19	66442.84	0.0180	17.22	4.3343E-07	0.01000
0.0020	0.993360	0.9386	71.63	66441.17	0.1436	30.54	4.3342E-07	0.01310
15 min								
0.0002	0.993338	0.6922	72.19	66442.64	-0.00159	-14.66	4.3372E-07	0.009590
0.0008	0.993350	0.6895	72.19	66441.84	-0.00314	-11.59	4.3351E-07	0.009553
0.0014	0.993351	0.8079	71.63	66441.77	0.064958	26.40	4.3345E-07	0.011280
0.0020	0.993343	0.8607	72.19	66442.31	0.095342	26.64	4.3357E-07	0.011923
30 min								
0.0002	0.993349	0.6893	72.19	66441.91	-0.0024	-16.87	4.3364E-07	0.009549
0.0008	0.993325	0.6958	72.19	66443.51	0.0013	8.64	4.3332E-07	0.009639
0.0014	0.993356	0.8133	71.63	66441.44	0.0691	26.95	4.3343E-07	0.011356
0.0020	0.993361	0.8741	71.63	66441.10	0.1041	27.44	4.3353E-07	0.012204

Table S6. Primary data of BSA with 5.0 mg/100 mL GO at 310.15 K.

gm/100 mL	ρ	η	γ	V_2	ϕ	R_h	$k_{s\phi}$	σ
0 min								
0.0002	0.993315	0.7344	72.19	66444.18	0.0228	35.64	4.3381E-07	0.010174
0.0008	0.993314	0.8182	71.62	66444.25	0.0710	32.78	4.3377E-07	0.011424
0.0014	0.993358	0.7002	72.19	66441.30	0.0031	9.61	4.3375E-07	0.009700
0.0020	0.993260	1.1571	71.62	66447.86	0.2661	37.51	4.3359E-07	0.016156
15 min								
0.0002	0.993268	0.6981	72.18	66447.32	0.002703	17.50	4.3365E-07	0.009671
0.0008	0.993329	0.8376	71.62	66443.24	0.08317	34.55	4.3325E-07	0.011694
0.0014	0.993325	0.7388	71.62	66443.51	0.026179	19.50	4.3365E-07	0.010315
0.0020	0.993321	0.7513	71.62	66443.78	0.033402	18.78	4.3372E-07	0.010490
30 min								

0.0002	0.993360	0.7021	72.19	66441.17	0.0071	24.17	4.3375E-07	0.00973
0.0008	0.993324	0.8411	71.62	66443.58	0.0878	35.17	4.331E-07	0.01175
0.0014	0.993329	0.8919	71.62	66443.24	0.1172	32.14	4.3372E-07	0.01245
0.0020	0.993265	0.7755	71.62	66447.52	0.0497	21.44	4.3378E-07	0.01083

Table S7. Primary data of BSA with 10.0 mg/100 mL GO at 310.15 K.

gm/100 mL	ρ	η	γ	V_2	ϕ	R_h	$k_{s\phi}$	σ
0 min								
0.0002	0.993407	0.7148	71.63	66438.03	0.0110	27.91	4.3373E-07	0.00998
0.0008	0.993461	0.7621	72.19	66434.41	0.0382	26.65	4.3363E-07	0.01056
0.0014	0.993447	0.8364	72.19	66435.35	0.0809	28.40	4.3391E-07	0.01158
0.0020	0.993454	0.7564	72.19	66434.88	0.0349	19.05	4.3364E-07	0.01048
15 min								
0.0002	0.993445	0.6949	72.19	66435.48	-0.00017	-6.96	4.3364E-07	0.00963
0.0008	0.993459	0.7523	71.63	66434.55	0.0328	25.34	4.3348E-07	0.01050
0.0014	0.993457	0.8655	71.63	66434.68	0.0979	30.28	4.3369E-07	0.01208
0.0020	0.993454	0.7939	71.63	66434.88	0.0568	22.42	4.3371E-07	0.01108
30 min								
0.0002	0.993442	0.6959	72.19	66435.69	0.0006	10.82	4.3367E-07	0.00964
0.0008	0.993463	0.7640	71.63	66434.28	0.0398	27.03	4.3363E-07	0.01067
0.0014	0.993461	0.9691	71.63	66434.41	0.1579	35.50	4.3345E-07	0.01353
0.0020	0.993451	0.8059	71.63	66435.08	0.0639	23.32	4.3376E-07	0.01125

Table S8. Primary data of Hb with 2.5 mg/100 mL GO at 310.15 K.

gm/100 mL	ρ	η	γ	V_2	ϕ	R_h	$k_{s\phi}$	σ
0 min								
0.0002	0.993344	0.7262	72.19	64932.19	0.0206	34.45	4.3376E-07	0.01006
0.0008	0.993350	0.8212	72.19	64931.80	0.0757	33.48	4.334E-07	0.01138
0.0014	0.993351	0.8484	71.63	64931.73	0.0914	29.59	4.3356E-07	0.01185
0.0020	0.993360	1.2362	71.63	64931.14	0.3160	39.72	4.3353E-07	0.01726
15 min								
0.0002	0.993350	0.7229	72.19	64931.80	0.0161	31.70	4.334E-07	0.01001
0.0008	0.993346	0.8076	72.19	64932.06	0.0648	31.79	4.3348E-07	0.01119
0.0014	0.993359	0.9007	71.63	64931.21	0.1184	32.25	4.3349E-07	0.01258
0.0020	0.993356	1.2047	70.52	64931.40	0.2934	38.75	4.3353E-07	0.01708
30 min								
0.0002	0.993350	0.7148	72.19	64931.80	0.0123	29.00	4.3374E-07	0.00990
0.0008	0.993356	0.8335	72.19	64931.40	0.0807	34.21	4.3344E-07	0.01155
0.0014	0.993359	0.9726	71.63	64931.21	0.1610	35.73	4.3353E-07	0.01358
0.0020	0.993361	1.1905	71.07	64931.08	0.2867	38.45	4.3361E-07	0.01675

Table S9. Primary data of Hb with 5.0 mg/100 mL GO at 310.15 K.

gm/100 mL	ρ	η	γ	V_2	ϕ	R_h	$k_{s\phi}$	σ
0 min								
0.0002	0.993253	0.6944	71.06	64938.14	-0.0002	-7.84	4.3325E-07	0.00977
0.0008	0.993337	0.7144	71.62	64932.65	0.0113	17.76	4.3375E-07	0.00997
0.0014	0.992991	0.7299	71.60	64955.27	0.0202	17.90	4.3338E-07	0.01019
0.0020	0.993074	0.8151	72.17	64949.84	0.0692	23.95	4.3324E-07	0.01129
15 min								
0.0002	0.993191	0.6942	70.51	64942.19	0.0005	9.76	4.3351E-07	0.00985
0.0008	0.993214	0.7093	71.61	64940.69	0.0092	16.58	4.3379E-07	0.00990
0.0014	0.992970	0.7411	71.60	64956.65	0.0275	19.83	4.3364E-07	0.01035
0.0020	0.992928	0.7354	72.16	64959.39	0.0242	16.88	4.3346E-07	0.01019
30 min								
0.0002	0.993252	0.6955	71.62	64938.20	0.0033	18.74	4.3313E-07	0.00971
0.0008	0.993150	0.7134	71.61	64944.87	0.0137	18.92	4.3349E-07	0.00996
0.0014	0.993092	0.7215	71.61	64948.67	0.0184	17.34	4.3303E-07	0.01008
0.0020	0.993199	0.7328	72.18	64941.67	0.0249	17.04	4.3356E-07	0.01015

Table S10. Primary data of Hb with 10.0 mg/100 mL GO at 310.15 K.

gm/100 mL	ρ	η	γ	V_2	ϕ	R_h	$k_{s\phi}$	σ
0 min								
0.0002	0.993414	0.7022	71.63	64927.61	0.0038	19.55	4.3371E-07	0.00980
0.0008	0.993443	0.7107	71.63	64925.72	0.0086	16.25	4.3373E-07	0.00992
0.0014	0.993442	0.7370	71.63	64925.78	0.0238	18.88	4.3368E-07	0.01029
0.0020	0.993442	0.7489	71.63	64925.78	0.0306	18.23	4.3369E-07	0.01045
15 min								
0.0002	0.993436	0.7029	71.63	64926.18	0.0044	20.60	4.3374E-07	0.00981
0.0008	0.993426	0.7175	71.63	64926.83	0.0129	18.54	4.3366E-07	0.01002
0.0014	0.993454	0.7401	71.63	64925.00	0.0258	19.41	4.3368E-07	0.01033
0.0020	0.993435	0.8299	71.63	64926.24	0.0775	24.86	4.3373E-07	0.01159
30 min								
0.0002	0.993427	0.7027	71.63	64926.76	0.0045	20.78	4.3374E-07	0.00981
0.0008	0.993425	0.7175	71.63	64926.89	0.0131	18.65	4.3359E-07	0.01002
0.0014	0.993424	0.7479	71.63	64926.96	0.0306	20.53	4.3373E-07	0.01044
0.0020	0.993427	0.8127	71.63	64926.76	0.0678	23.78	4.3377E-07	0.01135

Table S11. Primary data of dsDNA with 2.5 mg/100 mL GO at 310.15 K.

gm/100 mL	ρ	η	γ	V_2	ϕ	R_h	$k_{s\phi}$	σ
0 min								
0.0002	0.993355	0.6980	71.07	130869.63	0.0043	20.39	4.3372E-07	0.00982
0.0008	0.993358	0.7105	71.63	130869.23	0.0115	17.89	4.334E-07	0.00992
0.0014	0.993360	0.7276	72.19	130868.97	0.0214	18.24	4.3336E-07	0.01008
0.0020	0.993362	0.7428	72.19	130868.71	0.0302	18.17	4.3345E-07	0.01029
15 min								
0.0002	0.993358	0.6976	71.07	130869.23	0.0015	14.31	4.335E-07	0.00982
0.0008	0.993359	0.7055	72.19	130869.10	0.0061	14.42	4.3332E-07	0.00977
0.0014	0.993357	0.7190	72.19	130869.37	0.0138	15.75	4.334E-07	0.00996
0.0020	0.993359	0.7412	72.19	130869.10	0.0266	17.41	4.3349E-07	0.01027
30 min								
0.0002	0.993357	0.7010	72.19	130869.37	0.0043	20.49	4.3374E-07	0.00971
0.0008	0.993351	0.7101	72.19	130870.16	0.0096	16.82	4.333E-07	0.00984
0.0014	0.993360	0.7233	72.19	130868.97	0.0172	16.94	4.3339E-07	0.01002
0.0020	0.993361	0.7404	72.19	130868.84	0.0271	17.51	4.3363E-07	0.01026

Table S12. Primary data of dsDNA with 5.0 mg/100 mL GO at 310.15 K.

gm/100 mL	ρ	η	γ	V_2	ϕ	R_h	$k_{s\phi}$	σ
0 min								
0.0002	0.993360	0.6994	72.19	130868.97	0.0026	17.37	4.3372E-07	0.00969
0.0008	0.993367	0.7124	72.19	130868.05	0.0101	17.13	4.3326E-07	0.00987
0.0014	0.993357	0.7227	72.19	130869.37	0.0161	16.57	4.334E-07	0.01001
0.0020	0.993362	0.7380	72.76	130868.71	0.0249	17.03	4.336E-07	0.01014
15 min								
0.0002	0.993359	0.7031	71.63	130869.10	0.0056	22.30	4.337E-07	0.00982
0.0008	0.993365	0.7120	72.19	130868.31	0.0107	17.46	4.3326E-07	0.00986
0.0014	0.993366	0.7238	72.19	130868.18	0.0176	17.07	4.334E-07	0.01003
0.0020	0.993371	0.7350	72.76	130867.52	0.0240	16.82	4.3354E-07	0.01010
30 min								
0.0002	0.993365	0.7015	72.19	130868.31	0.0068	23.80	4.3342E-07	0.00972
0.0008	0.993362	0.7120	72.19	130868.71	0.0128	18.54	4.3324E-07	0.00986
0.0014	0.993369	0.7268	72.19	130867.78	0.0214	18.24	4.3338E-07	0.01007
0.0020	0.993369	0.7354	72.19	130867.78	0.0264	17.37	4.335E-07	0.01019

Table S13. Primary data of dsDNA with 10.0 mg/100 mL GO at 310.15 K.

gm/100 mL	ρ	η	γ	V_2	ϕ	R_h	$k_{s\phi}$	σ
0 min								
0.0002	0.993375	0.7312	72.19	130866.99	0.0204	34.33	4.3375E-07	0.01013
0.0008	0.993354	0.7000	72.19	130869.76	0.0025	10.72	4.3378E-07	0.00970

0.0014	0.993344	0.7093	72.19	130871.08	0.0078	13.04	4.3379E-07	0.00983
0.0020	0.993393	0.7207	72.19	130864.62	0.0144	14.18	4.3382E-07	0.00998
15 min								
0.0002	0.993363	0.6970	72.19	130868.57	0.0010	12.61	4.3373E-07	0.00965
0.0008	0.993378	0.7031	72.19	130866.60	0.0046	13.14	4.3381E-07	0.00974
0.0014	0.993333	0.7102	72.18	130872.53	0.0086	13.48	4.3382E-07	0.00984
0.0020	0.993397	0.7181	72.19	130864.10	0.0132	13.78	4.338E-07	0.00995
30 min								
0.0002	0.993328	0.6966	72.18	130873.19	0.0011	12.81	4.3376E-07	0.00965
0.0008	0.993369	0.7057	72.19	130867.78	0.0063	14.58	4.3385E-07	0.00978
0.0014	0.993370	0.7098	72.19	130867.65	0.0086	13.47	4.3381E-07	0.00983
0.0020	0.993348	0.7169	72.19	130870.55	0.0127	13.60	4.3381E-07	0.00993

Table S14. ρ vs gm/100 mL of aq-GO.

t (min)	Intercept	Slope
0	0.993330	0.000008
15	0.993317	0.000013
30	0.993328	0.000010

Table S15. η vs gm/100 mL of aq-GO.

t (min)	Intercept	Slope
0	0.6839	0.0032
15	0.6984	- 0.0017
30	0.7013	- 0.0039

Table S16. γ vs gm/100 mL of aq-GO.

t (min)	Intercept	Slope
0	72.18	0.00
15	72.18	0.00
30	72.18	0.00

Table S17. σ vs gm/100 mL of aq-GO.

t (min)	Intercept	Slope
0	0.00947	0.00004
15	0.00968	- 0.00002
30	0.00972	- 0.00005

Table S18. ρ vs gm/100 mL of aq-BSA.

t (min)	Intercept	Slope
0	0.993309	0.000022
15	0.993338	0.000022
30	0.993338	0.000018

Table S19. η vs gm/100 mL of aq-BSA.

t (min)	Intercept	Slope
0	0.6815	0.0008
15	0.6857	0.0034
30	0.6838	- 0.0027

Table S20. γ vs gm/100 mL of aq-BSA.

t (min)	Intercept	Slope
0	70.93	0.37
15	70.75	1.71
30	71.88	- 0.95

Table S21. σ vs gm/100 mL of aq-BSA.

t (min)	Intercept	Slope
0	0.00961	- 0.00004
15	0.00969	- 0.00018

30	0.00951	0.00009
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Table S22. ρ vs gm/100 mL of aq-Hb.

t (min)	Intercept	Slope
0	0.993327	0.000019
15	0.993337	0.000018
30	0.993336	- 0.000005

Table S23. η vs gm/100 mL of aq-Hb.

t (min)	Intercept	Slope
0	0.6935	- 0.0026
15	0.6948	0.0006
30	0.6969	- 0.0058

Table S24. γ vs gm/100 mL of aq-Hb.

t (min)	Intercept	Slope
0	72.75	0.00
15	72.75	0.00
30	72.75	0.00

Table S25. σ vs gm/100 mL of aq-Hb.

t (min)	Intercept	Slope
0	0.00953	- 0.00004
15	0.00955	0.00001
30	0.00958	- 0.00008

Table S26. ρ vs gm/100 mL of aq-dsDNA.

t (min)	Intercept	Slope
0	0.993331	0.000013
15	0.993338	- 0.000000
30	0.993340	- 0.000003

Table S27. η vs gm/100 mL of aq-dsDNA.

t (min)	Intercept	Slope
0	0.6810	0.0921
15	0.6761	0.1189
30	0.6762	0.1125

Table S28. γ vs gm/100 mL of aq-dsDNA.

t (min)	Intercept	Slope
0	72.20	1.19
15	72.13	0.77
30	72.26	0.19

Table S29. σ vs gm/100 mL of aq-dsDNA.

t (min)	Intercept	Slope
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0	0.00943	0.00111
15	0.00937	0.00154
30	0.00936	0.00154

Table S30. ρ vs gm/100 mL of BSA with 2.5 mg/100 mL GO.

t (min)	Intercept	Slope
0	0.993361	- 0.040444
15	0.993332	0.033222
30	0.993351	- 0.033139

Table S31. η vs gm/100 mL of BSA with 2.5 mg/100 mL GO.

t (min)	Intercept	Slope
0	0.7365	- 203.9441
15	0.6775	19.1580
30	0.6736	28.9929

Table S32. γ vs gm/100 mL of BSA with 2.5 mg/100 mL GO.

t (min)	Intercept	Slope
0	71.31	1,720.36
15	72.45	- 953.23
30	72.32	- 378.40

Table S33. σ vs gm/100 mL of BSA with 2.5 mg/100 mL GO.

t (min)	Intercept	Slope
0	0.0103	- 3.0834
15	0.0093	0.4144
30	0.0093	0.4543

Table S34. ρ vs gm/100 mL of Hb with 2.5 mg/100 mL GO.

t (min)	Intercept	Slope
0	0.993344	0.003583
15	0.993348	0.003639
30	0.993348	0.012111

Table S35. η vs gm/100 mL of Hb with 2.5 mg/100 mL GO.

t (min)	Intercept	Slope
0	0.7770	- 187.7137
15	0.7427	- 78.7008
30	0.6931	109.3192

Table S36. γ vs gm/100 mL of Hb with 2.5 mg/100 mL GO.

t (min)	Intercept	Slope
0	72.32	- 375.72
15	72.07	756.83
30	72.19	195.56

Table S37. σ vs gm/100 mL of Hb with 2.5 mg/100 mL GO.

t (min)	Intercept	Slope
0	0.0108	- 2.5821
15	0.0103	- 1.3290
30	0.0096	1.4272

Table S38. ρ vs gm/100 mL of dsDNA with 2.5 mg/100 mL GO.

t (min)	Intercept	Slope
0	0.993354	0.005361
15	0.993359	- 0.001361
30	0.993357	- 0.007194

Table S39. η vs gm/100 mL of dsDNA with 2.5 mg/100 mL GO.

t (min)	Intercept	Slope
0	0.6933	21.2191
15	0.6969	2.1654
30	0.6989	9.5612

Table S40. γ vs gm/100 mL of dsDNA with 2.5 mg/100 mL GO.

t (min)	Intercept	Slope
0	70.76	1,502.29
15	70.70	2,269.47
30	72.19	- 0.52

Table S41. σ vs gm/100 mL of dsDNA with 2.5 mg/100 mL GO.

t (min)	Intercept	Slope
0	0.0098	0.0906
15	0.0099	- 0.2786
30	0.0097	0.1325

Table S42. ρ vs gm/100 mL of BSA with 5.0 mg/100 mL GO.

t (min)	Intercept	Slope
0	0.993283	0.128028
15	0.993248	0.125139
30	0.993356	- 0.003889

Table S43. η vs gm/100 mL of BSA with 5.0 mg/100 mL GO.

t (min)	Intercept	Slope
0	0.8386	- 378.3493
15	0.6783	204.1200
30	0.6182	435.4340

Table S44. γ vs gm/100 mL of BSA with 5.0 mg/100 mL GO.

t (min)	Intercept	Slope
0	72.11	- 178.71
15	72.37	- 1,134.49
30	72.37	- 1,143.90

Table S45. σ vs gm/100 mL of BSA with 5.0 mg/100 mL GO.

t (min)	Intercept	Slope
0	0.0116	- 5.2512
15	0.0094	3.0031
30	0.0085	6.2354

Table S46. ρ vs gm/100 mL of Hb with 5.0 mg/100 mL GO.

t (min)	Intercept	Slope
0	0.993325	- 0.145639
15	0.993231	- 0.072861
30	0.993323	- 0.355472

Table S47. η vs gm/100 mL of Hb with 5.0 mg/100 mL GO.

t (min)	Intercept	Slope
0	0.7036	- 36.5108
15	0.6805	57.6860
30	0.6903	30.0683

Table S48. γ vs gm/100 mL of Hb with 5.0 mg/100 mL GO.

t (min)	Intercept	Slope
0	71.01	535.79

15	70.28	1,649.44
30	71.75	- 605.18

Table S49. σ vs gm/100 mL of Hb with 5.0 mg/100 mL GO.

t (min)	Intercept	Slope
0	0.0099	- 0.5707
15	0.0097	0.5817
30	0.0096	0.5056

Table S50. ρ vs gm/100 mL of dsDNA with 5.0 mg/100 mL GO.

t (min)	Intercept	Slope
0	0.993361	0.002389
15	0.993358	0.007694
30	0.993364	- 0.001417

Table S51. η vs gm/100 mL of dsDNA with 5.0 mg/100 mL GO.

t (min)	Intercept	Slope
0	0.6962	17.5389
15	0.6999	14.4921
30	0.6966	22.1658

Table S52. γ vs gm/100 mL of dsDNA with 5.0 mg/100 mL GO.

t (min)	Intercept	Slope
0	72.32	- 588.67
15	71.57	555.33
30	72.19	- 0.10

Table S53. σ vs gm/100 mL of dsDNA with 5.0 mg/100 mL GO.

t (min)	Intercept	Slope
0	0.0096	0.3257
15	0.0098	0.1276
30	0.0097	0.3071

Table S54. ρ vs gm/100 mL of BSA with 10.0 mg/100 mL GO.

t (min)	Intercept	Slope
0	0.993394	0.092972
15	0.993433	0.051528
30	0.993433	0.051528

Table S55. η vs gm/100 mL of BSA with 10.0 mg/100 mL GO.

t (min)	Intercept	Slope
0	0.6637	227.7093
15	0.6334	265.2764
30	0.5885	442.6556

Table S56. γ vs gm/100 mL of BSA with 10.0 mg/100 mL GO.

t (min)	Intercept	Slope
0	71.44	1,150.39
15	72.38	- 1,141.51
30	72.38	- 1,139.96

Table S57. σ vs gm/100 mL of BSA with 10.0 mg/100 mL GO.

t (min)	Intercept	Slope
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Table S66. The % α helix for aq-proteins and with aq-GO after three LET.

Systems	mg/100 mL	0	15	30 min LE
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0	0.0093	2.9950
15	0.0087	3.8568
30	0.0081	6.3330

Table S58. ρ vs gm/100 mL of Hb with 10.0 mg/100 mL GO.

t (min)	Intercept	Slope
0	0.993405	0.058139
15	0.993428	0.017917
30	0.993429	- 0.007806

Table S59. η vs gm/100 mL of Hb with 10.0 mg/100 mL GO.

t (min)	Intercept	Slope
0	0.6960	22.5479
15	0.7133	- 47.5808
30	0.7055	- 16.1948

Table S60. γ vs gm/100 mL of Hb with 10.0 mg/100 mL GO.

t (min)	Intercept	Slope
0	71.63	4.19
15	71.63	1.29
30	71.63	- 0.56

Table S61. σ vs gm/100 mL of Hb with 10.0 mg/100 mL GO.

t (min)	Intercept	Slope
0	0.0097	0.3142
15	0.0100	- 0.6645
30	0.0098	- 0.2260

Table S62. ρ vs gm/100 mL of dsDNA with 10.0 mg/100 mL GO.

t (min)	Intercept	Slope
0	0.993395	- 0.099611
15	0.993383	- 0.065361
30	0.993309	0.106417

Table S63. η vs gm/100 mL of dsDNA with 10.0 mg/100 mL GO.

t (min)	Intercept	Slope
0	0.7418	- 68.7383
15	0.6951	9.1450
30	0.6943	13.7521

Table S64. γ vs gm/100 mL of dsDNA with 10.0 mg/100 mL GO.

t (min)	Intercept	Slope
0	72.19	- 7.24
15	72.19	- 4.75
30	72.18	7.73

Table S65. σ vs gm/100 mL of dsDNA with 10.0 mg/100 mL GO.

t (min)	Intercept	Slope
0	0.0103	- 0.9512
15	0.0096	0.1273
30	0.0096	0.1895

		$\lambda = 208$	$\lambda = 222$	208	222	208	222 nm
Aq-BSA	0.2	-14.10	-6.78	-17.14	-9.81	-16.93	-11.26
	0.8	21.64	23.73	5.56	13.61	-11.26	49.31
	1.4	23.93	24.87	25.69	27.47	3.95	6.50
	2.0	32.06	31.39	40.01	39.60	38.99	38.22
BSA with 2.5 mg/100 mL GO	0.2	8.05	8.77	-12.53	-0.44	-39.33	-23.39
	0.8	-4.14	-0.36	-7.36	0.75	-8.14	-4.63
	1.4	-2.25	-0.19	-9.99	-4.45	-9.14	-5.73
	2.0	-2.99	0.00017	-7.64	-4.79	-4.26	-1.39
BSA with 5.0 mg/100 mL GO	0.2	154.64	5.69	41.26	-2.08	-2.94	-12.99
	0.8	37.09	1.61	4.58	1.69	-2.14	-3.52
	1.4	25.19	0.33	-2.39	-4.03	-4.00	-2.27
	2.0	7.55	-4.53	-5.98	-4.46	-7.56	-4.85
BSA with 10.0 mg/100 mL GO	0.2	-35.31	17.41	-80.64	67.10	319.98	-194.07
	0.8	-2.71	-0.57	-13.87	12.30	85.97	-42.92
	1.4	-10.60	-1.81	-14.22	3.47	52.46	-30.19
	2.0	-7.36	-0.14	-14.31	1.33	33.87	-22.46
Aq-Hb	0.2	-26.22	-12.75	-18.43	-9.89	-12.60	-8.17
	0.8	-12.92	-8.79	-13.99	-7.75	-13.91	-7.53
	1.4	-12.86	-7.64	-11.45	-5.95	-13.05	-6.35
	2.0	0.57	7.92	-1.58	5.94	-0.17	6.99
HB with 2.5 mg/100 mL GO	0.2	-8.36	-3.25	-21.55	-3.58	-34.75	-25.23
	0.8	-6.34	-3.63	-12.72	-3.98	-13.27	-6.92
	1.4	-8.82	-3.98	-11.16	-3.41	-9.95	-5.73
	2.0	-11.54	-5.87	-11.93	-6.15	-12.64	-7.49
Hb with 5.0 mg/100 mL GO	0.2	139.46	-6.33	16.59	-14.54	1.98	-31.36
	0.8	3.07	-3.06	-4.03	-9.94	-9.02	-7.44
	1.4	14.69	-5.26	-6.52	-7.10	-9.32	-7.84
	2.0	5.24	-5.88	-8.46	-7.71	-11.62	-7.71
Hb with 10.0 mg/100 mL GO	0.2	18.06	12.64	-44.96	2.96	338.02	-216.18
	0.8	56.77	3.31	-24.28	5.25	92.28	-54.89
	1.4	28.75	6.11	-10.46	2.86	48.67	-31.03
	2.0	14.20	0.49	-9.44	-0.89	26.00	-27.04