

High Yield Graphene Production Arising from Synergistic Effect of Inflated Temperature and Gelatin Offers Higher Stability and Cellular Compatibility

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SUPPORTING INFORMATIONS

Figure S1. Effect of sonication on gelatin concentration by measuring UV spectra of gelatin solution with and without sonication.

Figure S2. Surface tension measurement of Water and Water-gel system measured at 24°C.

Figure S3. Effect of temperature increment on G production (a) Uv-vis spectra (b) A/l_{660} (cm^{-1}) value of G-80C, G-70C and G-60C.

Figure S4. AFM image of exfoliated G sheets at various temperature (a) 80C (b) 70C (c) 60C (d) Lateral width of exfoliated G at varying temperature.

Figure S5. Effect of increase in total particle concentration on graphene yield by measuring A/l_{660} (cm^{-1}) value.

Figure S6. Zeta potential of Ggel4 at different pH values.

Figure S7. Calibration plot of Ggel4 to calculate extinction coefficient at 660nm at pH7 in milliQ water.

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Figure S10. Traces (DLS and Zeta Potential) for Ggel4 after 1 and 7 hrs sonication.

Figure S11. Colloidal stability of Ggel4 under different storage conditions (a) after 1 day (b) after 31 days.

Figure S12. SEM images of (a) Control RBCs (b) Ggel4 (1mg/mL) with RBCs (c) Ggel4 (10mg/mL) with RBCs.

Table S1. Effect of exfoliation condition, sonication applied for 2hrs .Then centrifugation at 4000 r.p.m. for 15minutes.

Table S2. Effect of Graphite to gelatin ratio, sonication applied for 7hrs with temperature maintained~60°C. Then centrifugation at 4000 r.p.m. for 15minutes.

Table S3. Effect of total particle concentration, sonication applied for 2hrs with temperature maintained~60°C. Then centrifugation at 4000 r.p.m. for 15minutes.

Table S4. Comparisons in G yield with variation in proteins and sonication condition.

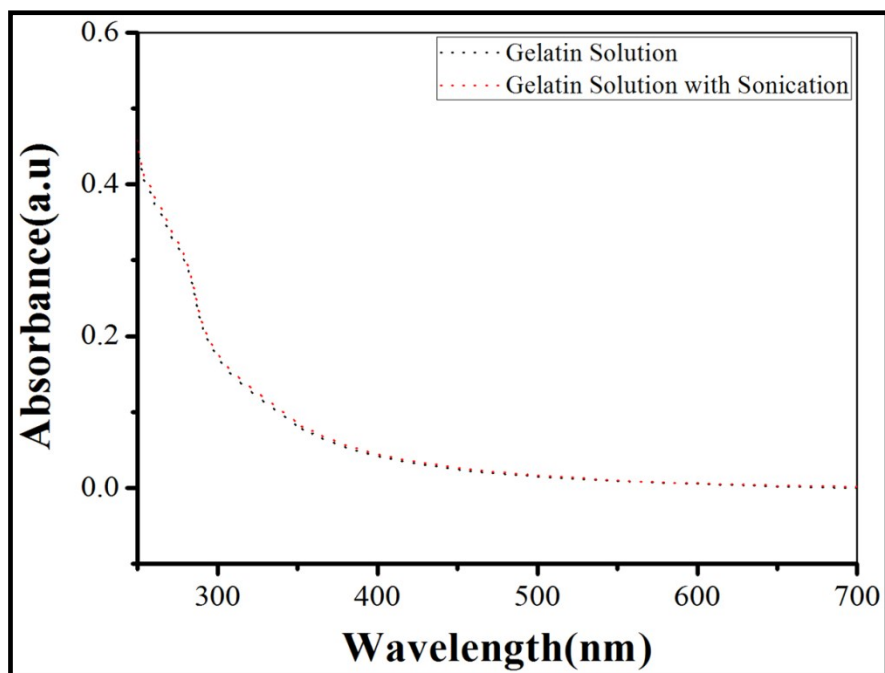


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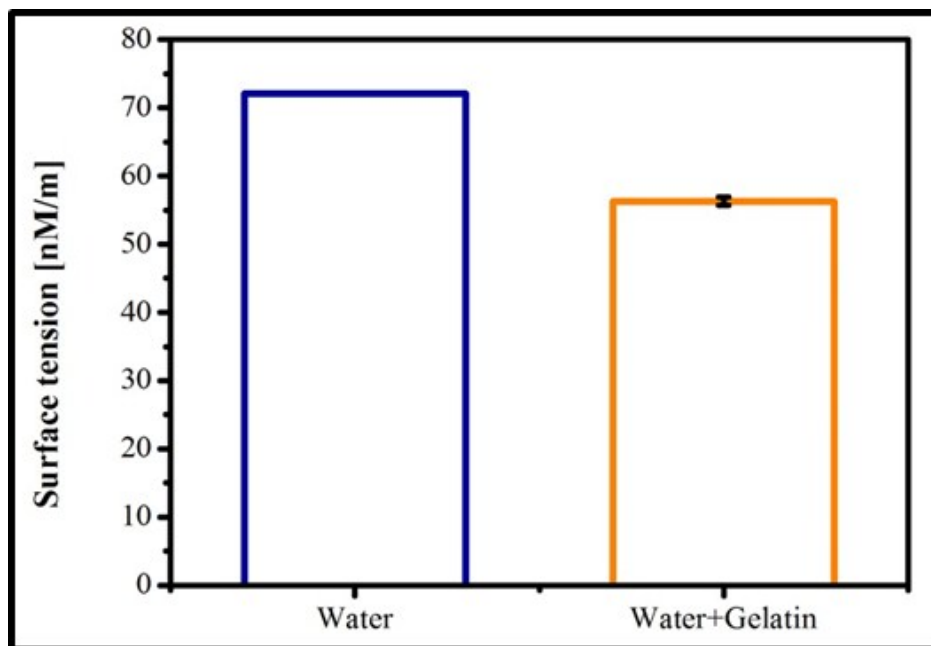


Figure S2. Surface tension measurement of Water and Water-gel system measured at 24°C.

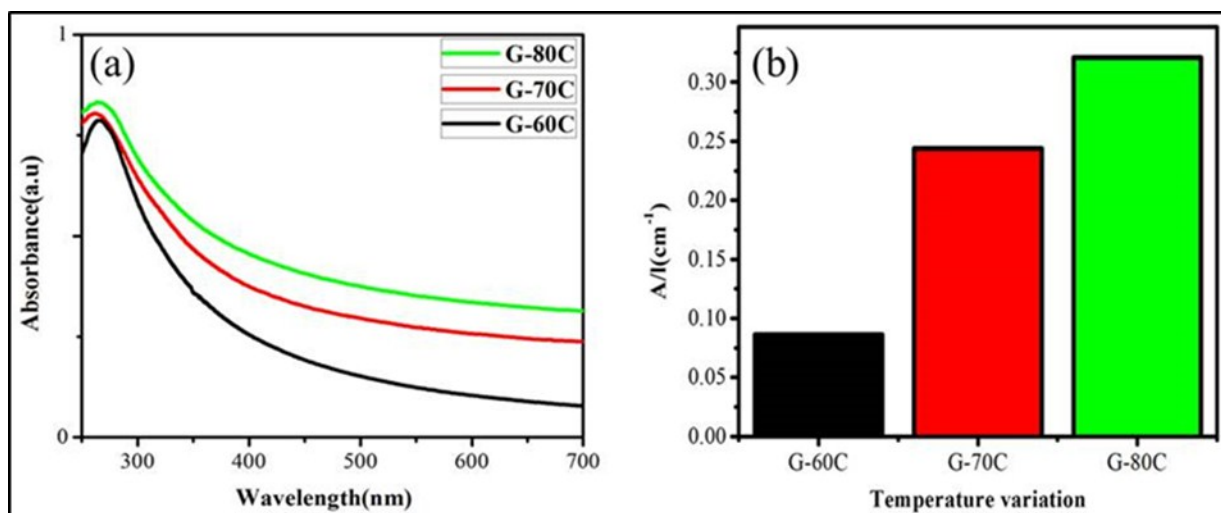


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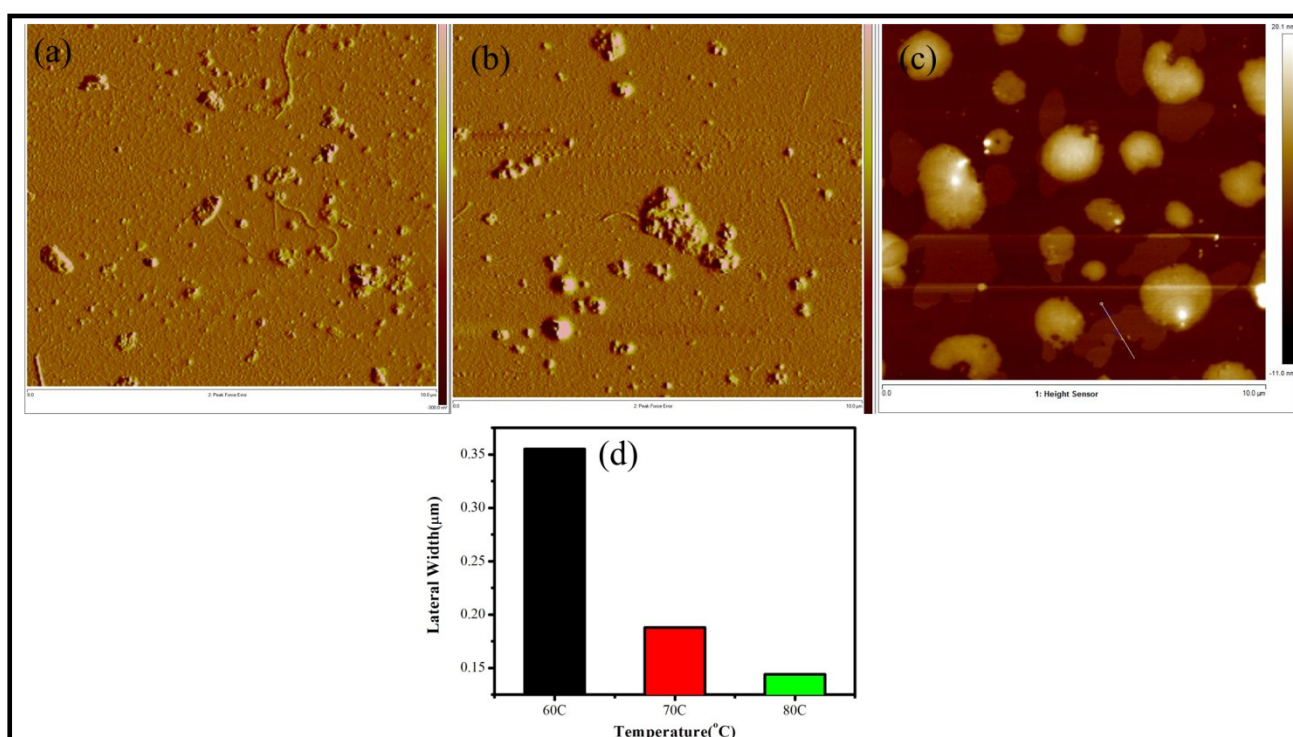


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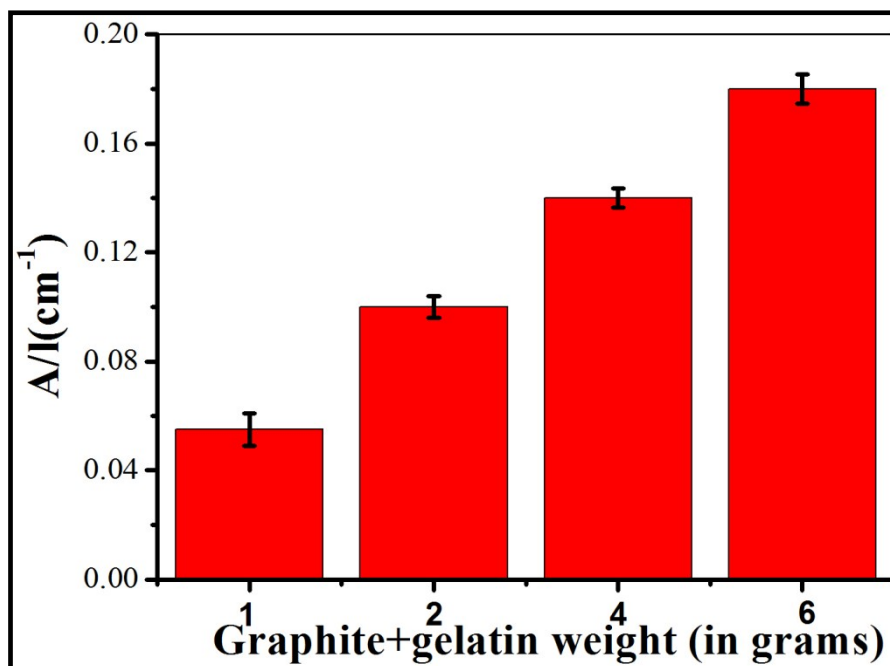


Figure S5. Effect of increase in total particle concentration on graphene yield by measuring A/I_{660} (cm^{-1}) value.

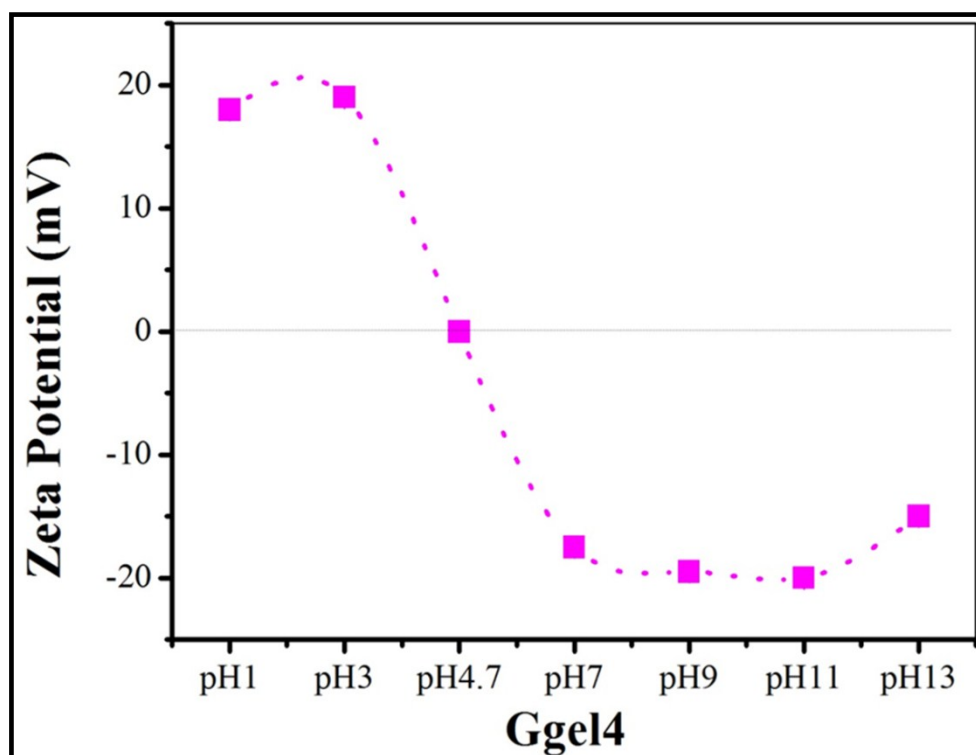


Figure S6. Zeta potential of Ggel4 at different pH values.

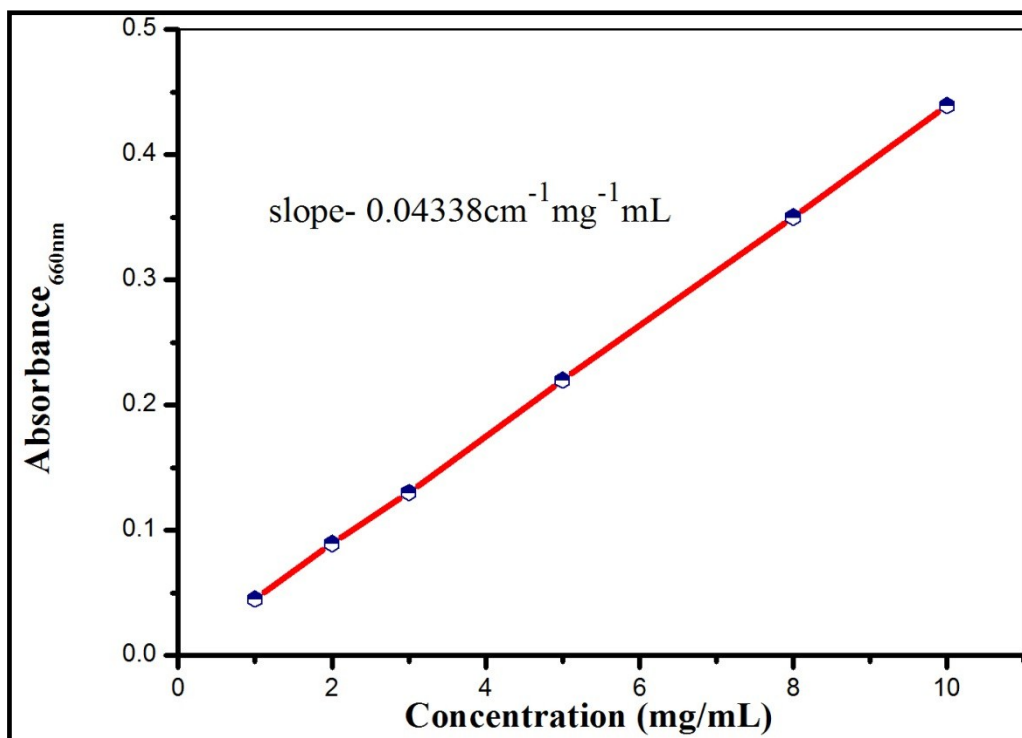


Figure S7. Calibration plot of Ggel4 to calculate extinction coefficient at 660nm at pH7 in milliQ water.

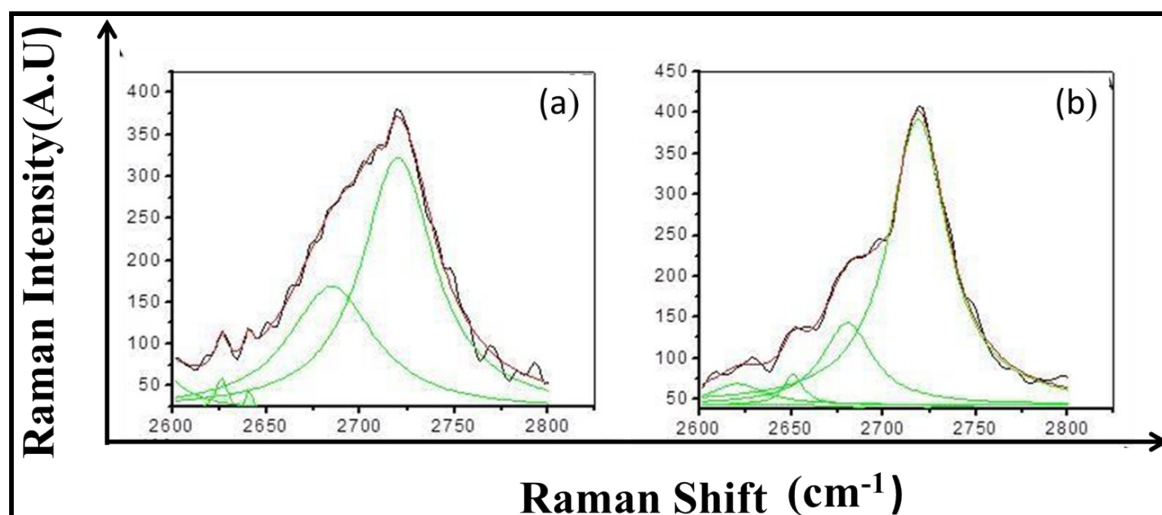


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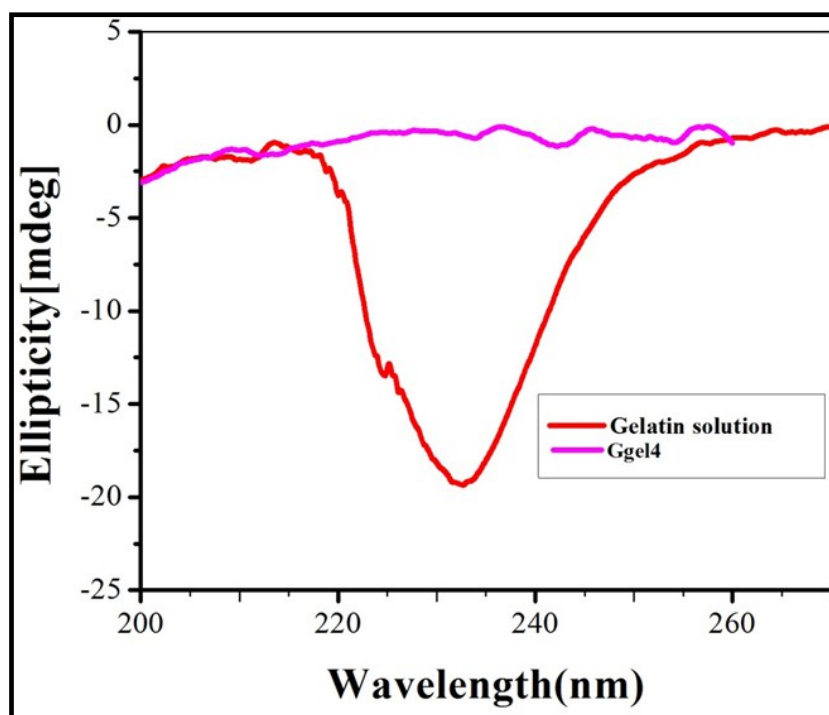


Figure S9. Circular dichroism spectra of gelatin solution and Ggel4.

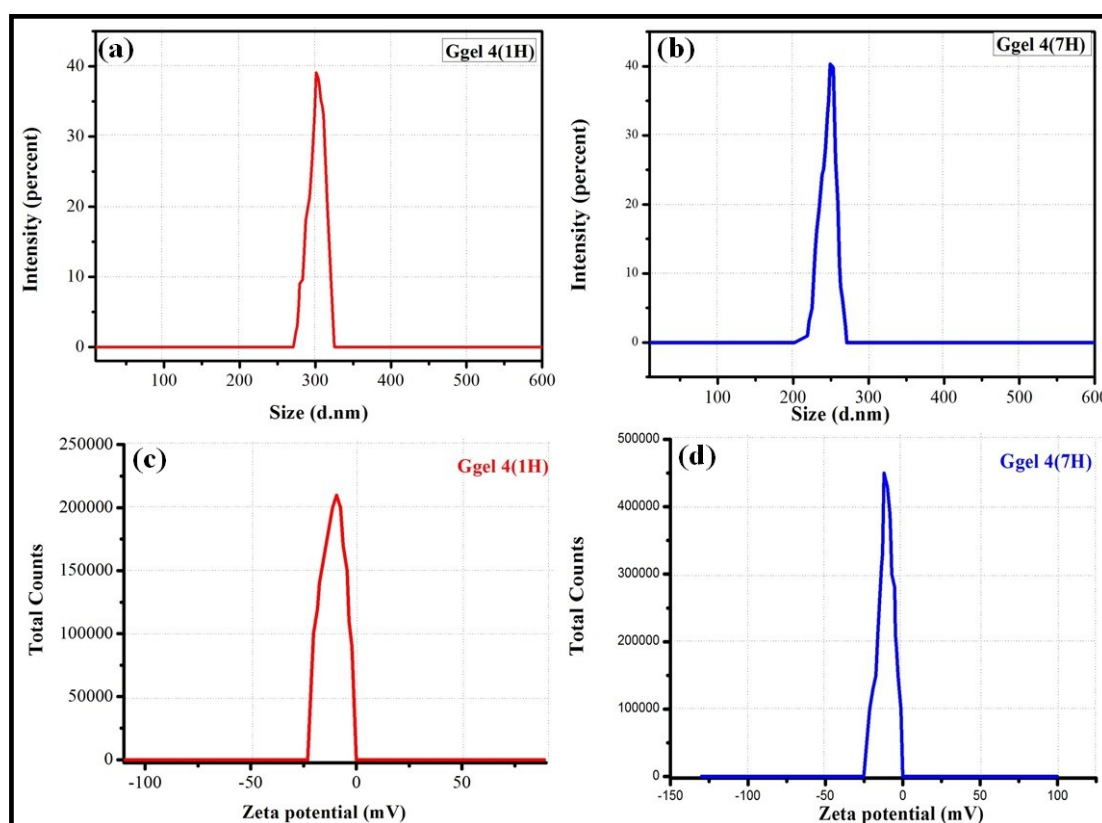


Figure S10. Traces (DLS and Zeta Potential) for Ggel4 after 1 and 7 hrs sonication (a) DLS of Ggel 4(1H) (b) DLS of Ggel4 (7H) (c) Zeta potential of Ggel 4(1H) (d) Zeta potential of Ggel4 (7H).

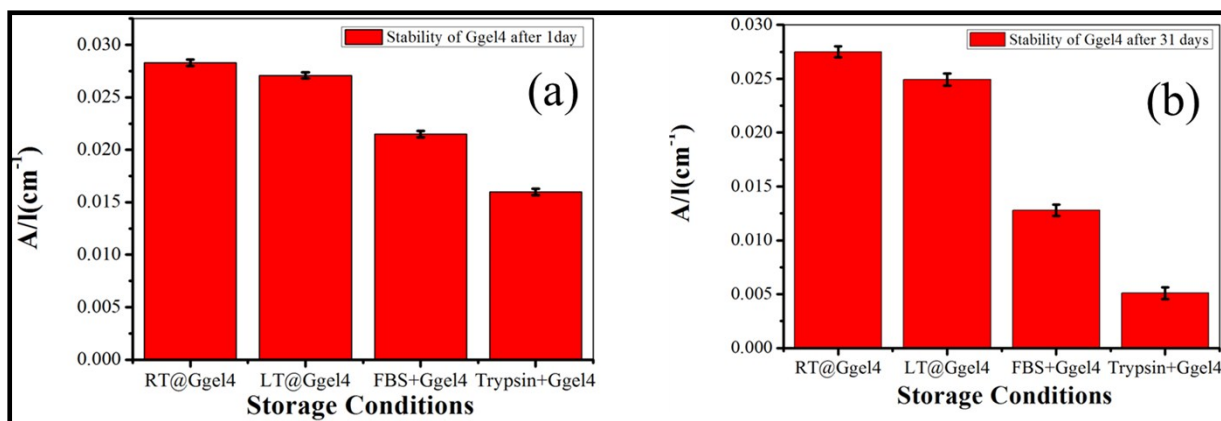


Figure S11. Colloidal stability of Ggel4 under different storage conditions (a) after 1 day (b) after 31 days.

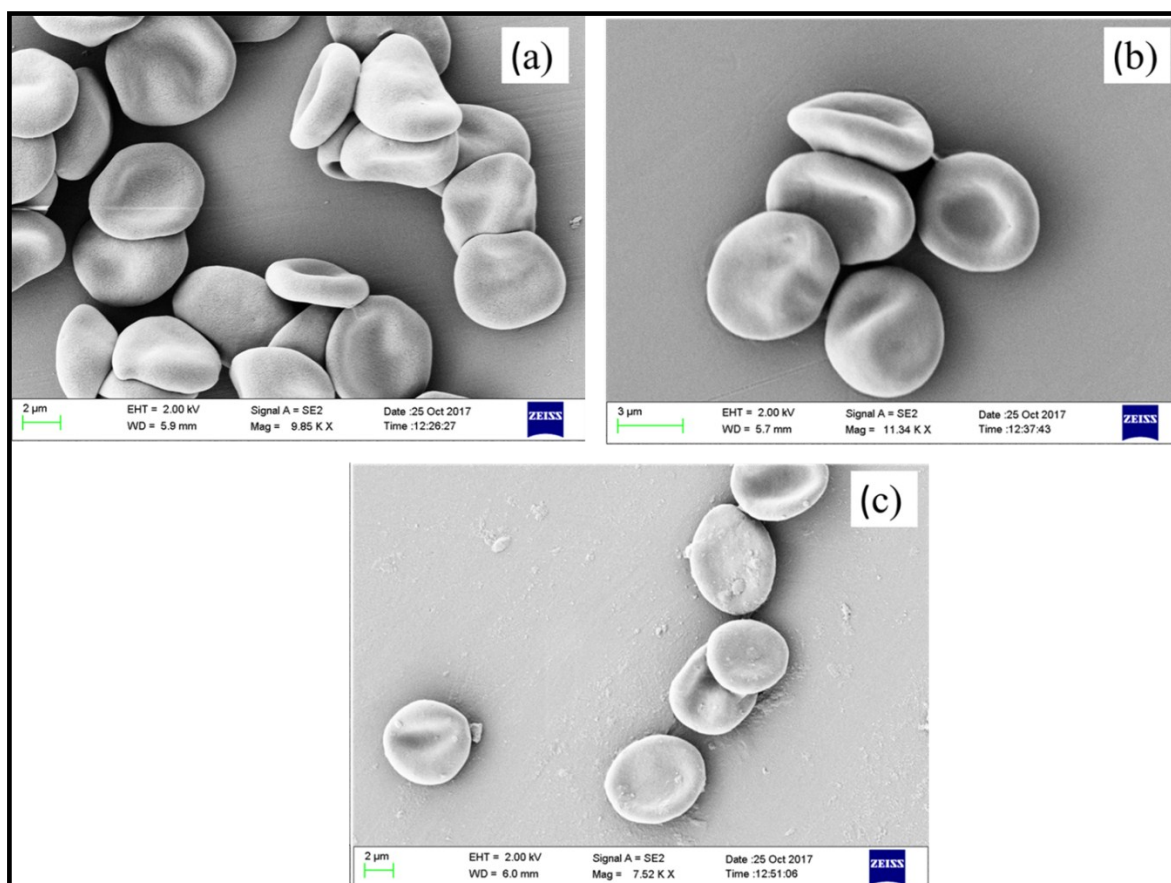


Figure S12. SEM images of (a) Control RBCs (b) Ggel4 (1mg/mL) with RBCs (c) Ggel4 (10mg/mL) with RBCs.

Table S1. Effect of exfoliation condition, sonication applied for 2hrs .Then centrifugation at 4000 r.p.m. for 15minutes.

Sample	Graphite	Gelatin	Volume	Time	Temperature(°C)
No Sonicated(only stirring)	30mg	20mg	5mL	2hrs	-
Sonicated	-do-	-do-	5mL	-do-	-
Sonicated with heating	-do-	-do-	5mL	-do-	60

Table S2. Effect of Graphite to gelatin ratio, sonication applied for 7hrs with temperature maintained~60°C. Then centrifugation at 4000 r.p.m. for 15minutes.

Sl no	Sample name	Graphite(mg)	Gelatin(mg)	Volume(mL)
1.	Ggel1	45	5	5
2.	Ggel2	40	10	-do-
3.	Ggel3	35	15	-do-
4.	Ggel4	30	20	-do-
5.	Ggel5	25	25	-do-

Table S3. Effect of total particle concentration, sonication applied for 2hrs with temperature maintained~60°C. Then centrifugation at 4000 r.p.m. for 15minutes.

Sl no	Sample	Graphite(mg)	Gelatin(mg)	Volume(mL)
1.	1gm/100mL	30	20	5
2.	2gm/100mL	60	40	-do-
3.	4gm/100mL	120	80	-do-
4.	6gm/100mL	180	120	-do-

Table S4. Comparison in G yield with variation in proteins and sonication condition

Sln0	Biomolecules (Protein/Peptides)	Exfoliation condition	Concentration (mg/mL)	Applications	References
1.	HFBI	40 min Bath sonication/Tip sonication Temp= Not mentioned	0.04	-	<i>Angew. Chem. Int. Ed.</i> , 2010, 49, 4946–4949
2.	Vmh2	Probe Sonication Temp= Not mentioned	0.5	-	<i>Adv. Funct. Mater.</i> , 2015, 25, 2771–2779.

3.	BSA	48hrs Bath sonication	0.85	-	<i>J. Am. Chem. Soc.</i> , 2015, 137, 6152–6155
		Temp= Not mentioned 3hrs Probe Sonication Temp~25°C	0.8	Biocompatible, Used to increase conductivity of hydrophilic hydrogels.	<i>Nanoscale</i> , 2015, 7, 6436–6443.
4.	Lysozyme	6 hrs Probe Sonication	2.09	<i>Anti-cancerous</i>	<i>RSC Adv.</i> , 2013, 4, 4085–4093
		Temp= Not mentioned 150 min Probe sonication	0.18	<i>Catalytic activity towards reduction of o-nitroaniline</i>	<i>Nano Res.</i> , 2013, 6, 693–702
5.	Calf histone	Not mentioned	Not mentioned	-	<i>RSC Adv.</i> , 2013, 4, 4085–4093
6.	Amphilic Peptides	24 hrs Bath Sonication Temp=<65°C	0.03	-	<i>J. Mater. Chem. B</i> , 2015, 4, 152–161
7.	Liposomes	2 hrs Sonication Temp= Not mentioned	0.124±0.010	Anti-bacterial activities	<i>J. Mater. Chem. B</i> , 2015, 3, 6520
8.	Gelatin	7 hrs Bath Sonication, (Gr: gel 60:40)total concentration(1gm/100mL)	4.37	Biocompatible and Hemocompatible	Present Work
		2hrs Bath Sonication, (Gr: gel 60:40)total concentration(6gm/100mL)	4.14		Present Work