Supporting Information

Hydrogen Bond Regulating Miscibility of Graphene Oxide and Nonionic Water-Soluble Polymers

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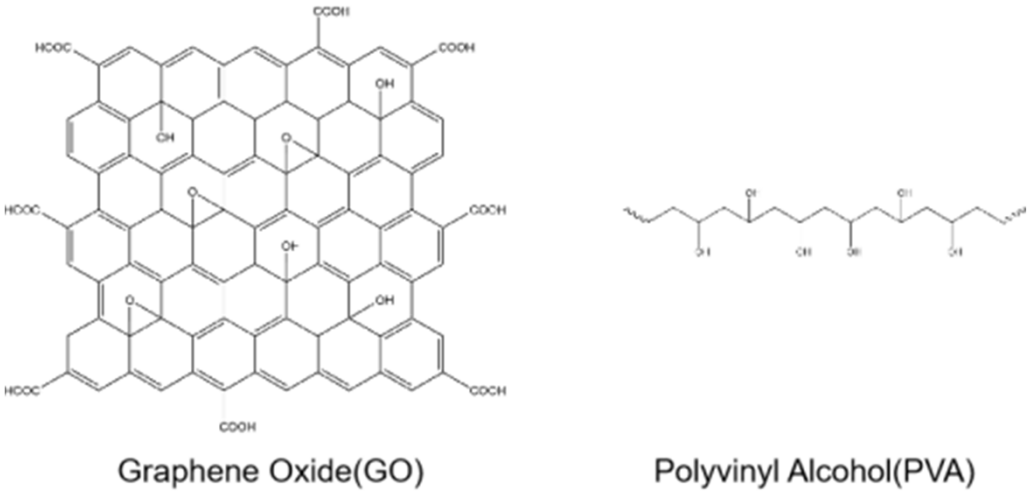
(a)



(b)

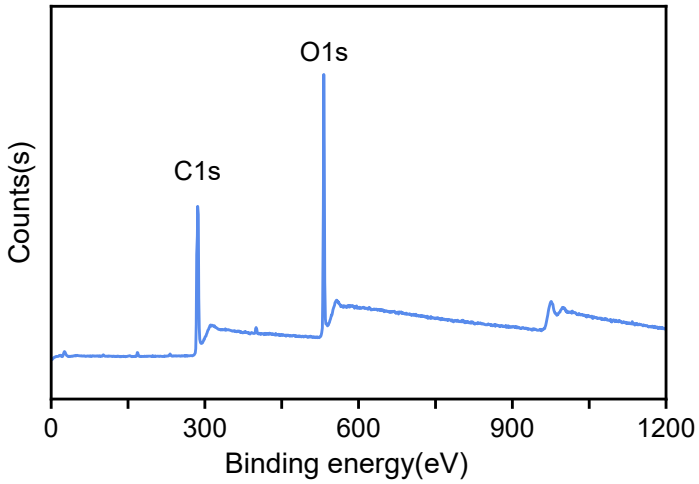


Fig S1. (a) Chemical structure of GO and PVA. (b) XPS spectrum of GO.

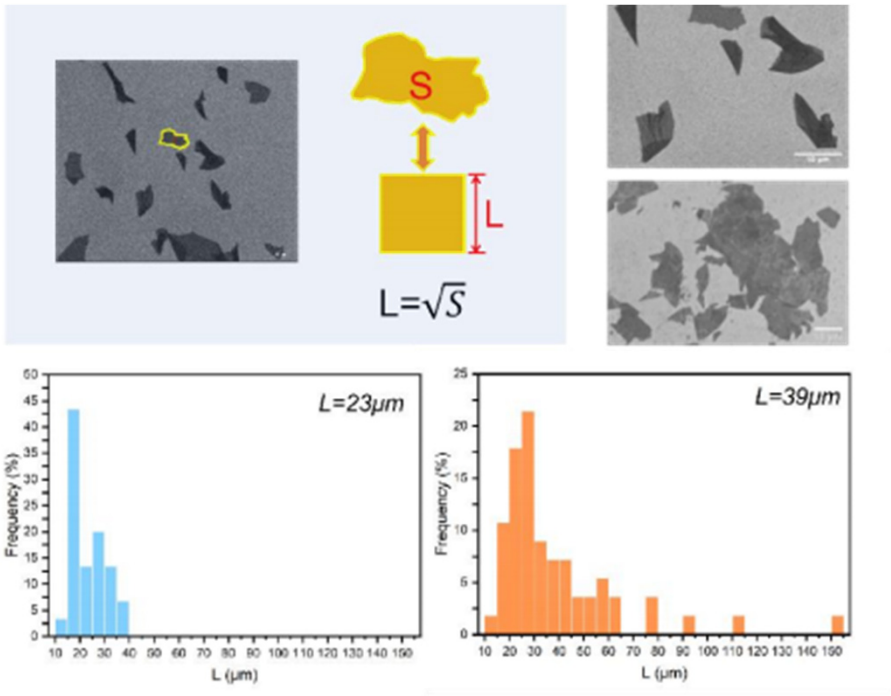


Fig S2. Statistical results of the size of GO sheets with (orange) and without (blue) adding PVA. The mean size of the former is 39 μm and the latter is 23 μm. The sampling number is over 200 sheets.

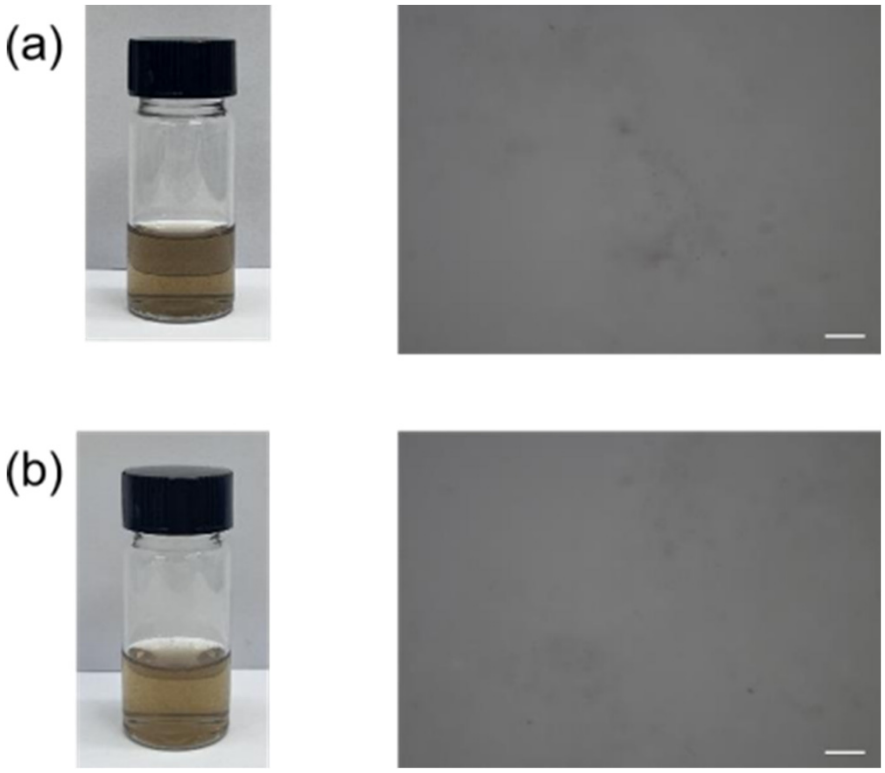


Fig S3. Digital and OM images of aggregated GO-PVA mixture with low concentration at room temperature before (a) and after ultrasonication (b). Scale bars are 100 um.

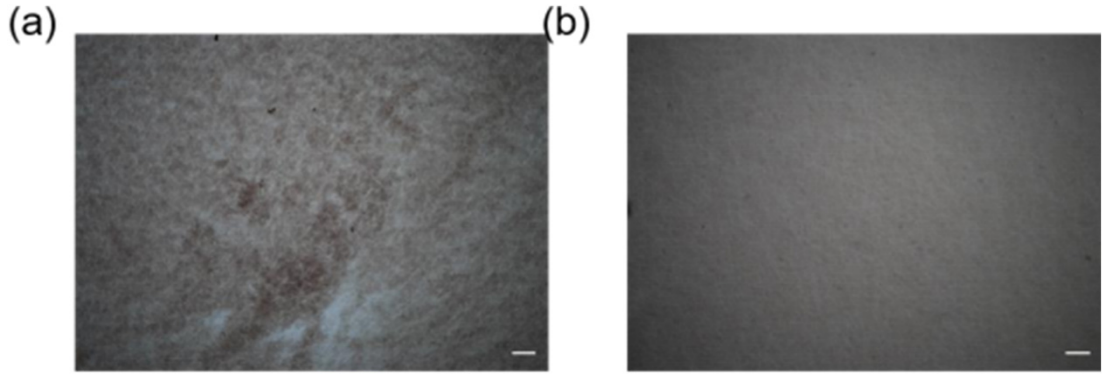


Fig S4. OM images of inhomogeneous high concentration GO-PVA mixture (a) and homogeneous pure GO(b). Scale bars are 100 um.

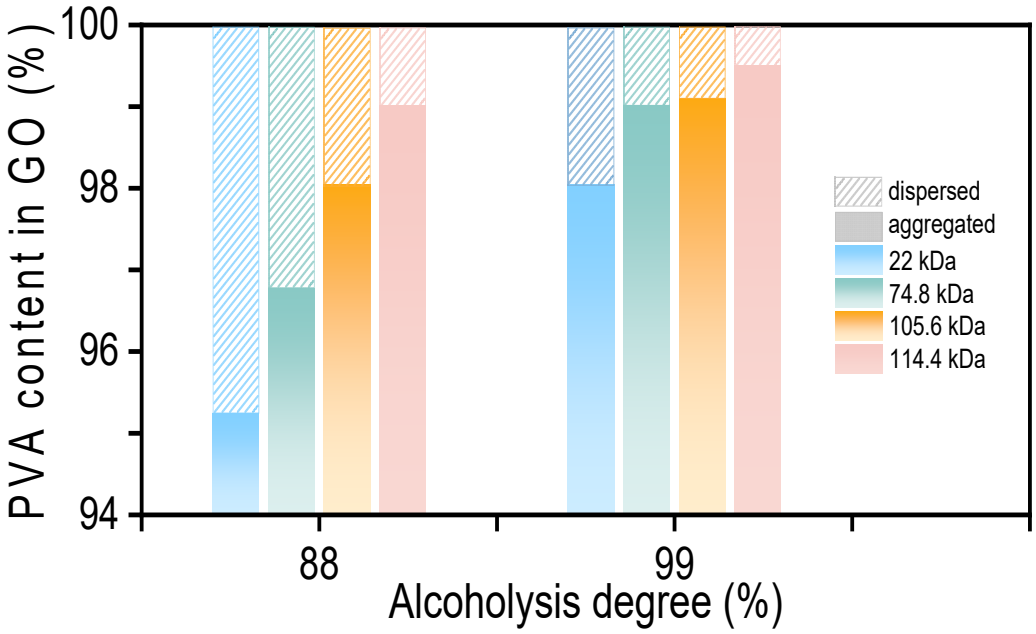


Fig S5. Critical PVA content in GO under diifferent alholysis degree of 88% and 99%.

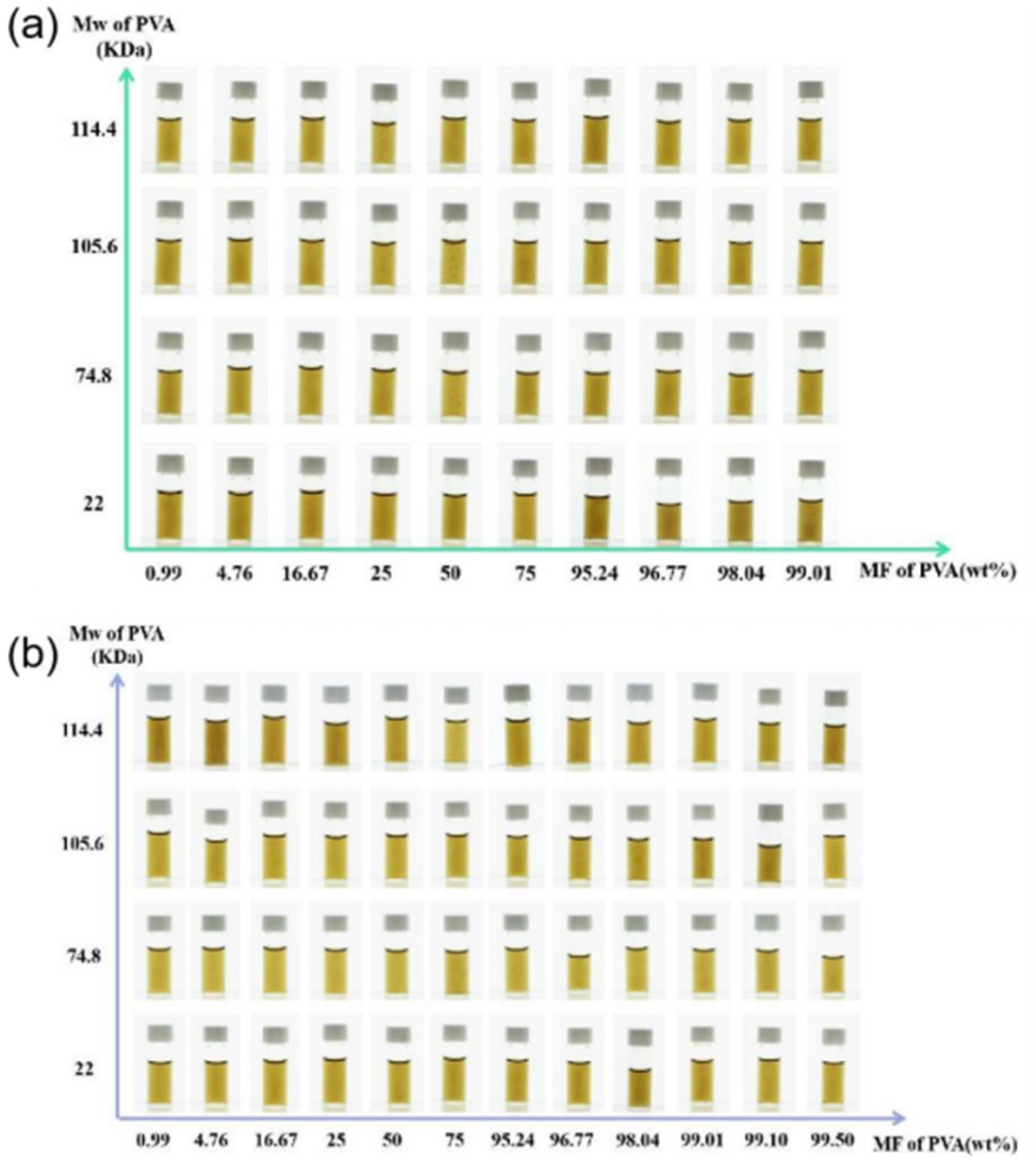


Fig S6. Digital images of GO-PVA mixture at different mass fraction and molecular weight and fixed alcoholysis degree of 88% (a) and 99% (b).

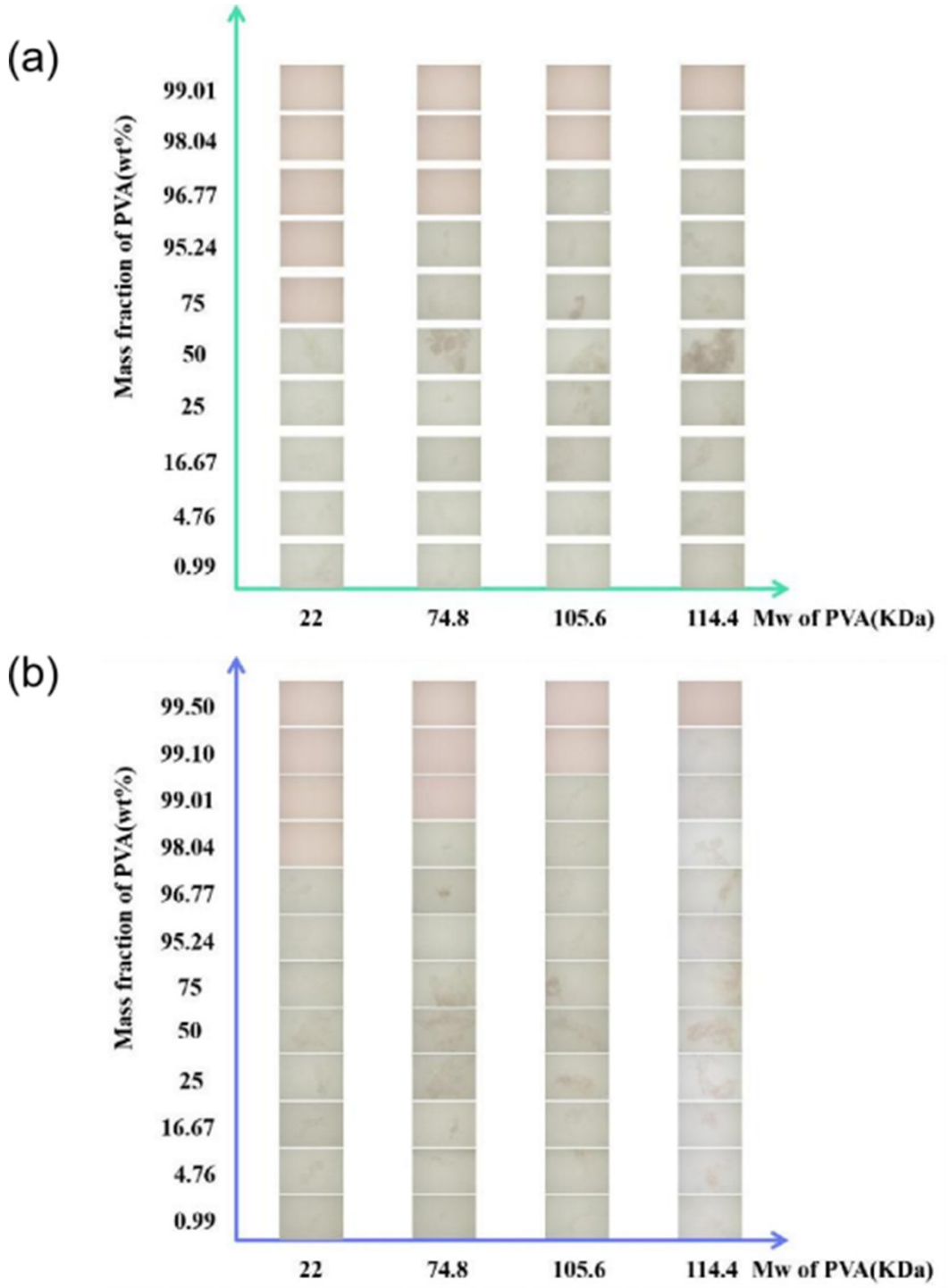


Fig S7. OM images of GO-PVA mixture at different mass fraction and molecular weight and fixed alcoholysis degree of 88% (a) and 99% (b). Scale bars are 100 um.

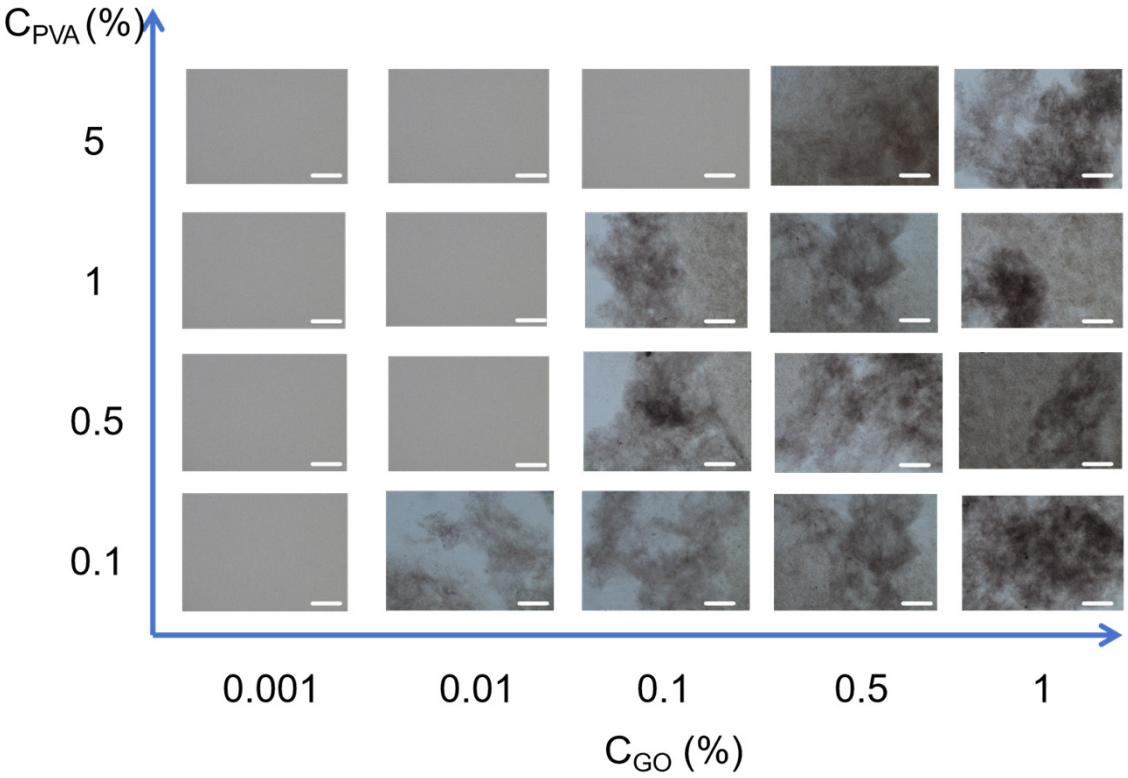


Fig S8. OM images of GO-PVA mixture at different mass fraction over the concentrated range at fixed PVA with molecular weight of 22 kDa and alcoholysis degree of 88% .Scale bars are 100 um.

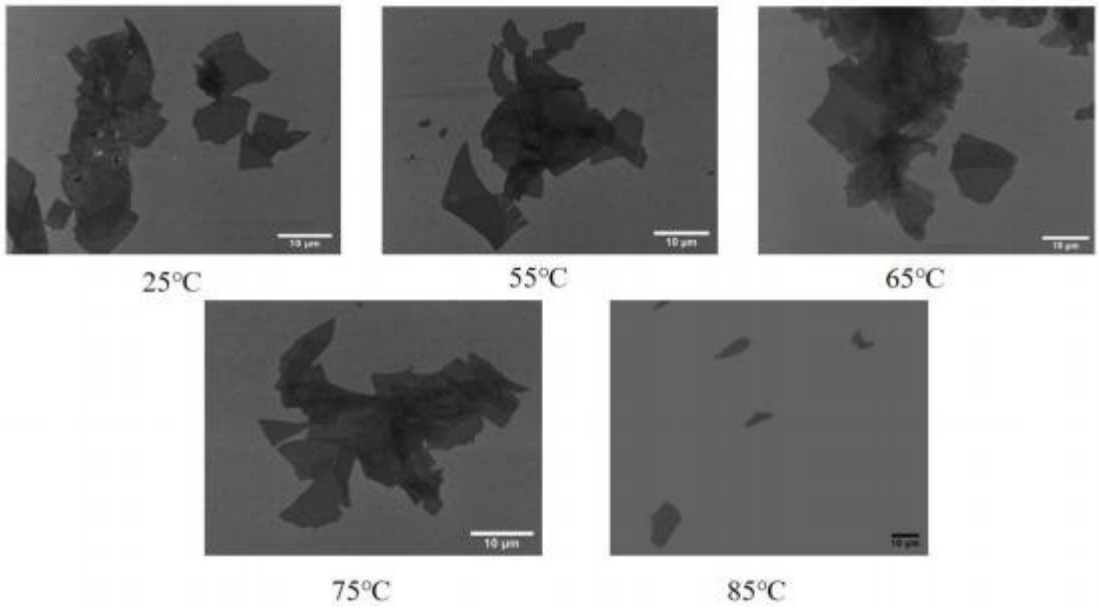


Fig S9. SEM images of GO-PVA mixture at different temperature.

Fig S10. Digital (a) and OM (b) images of homogeneous GO-PVA (114.4 kDa and aloholysis degree of 88%) mixture after preheating. Scale bars are 100 um.

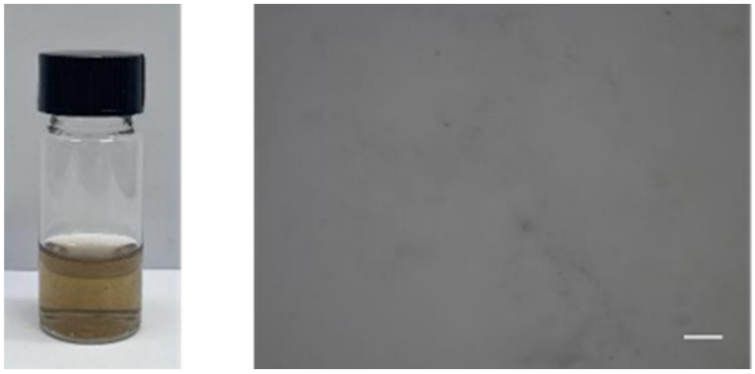


Fig S11. Digital and OM images of aggregated GO-PVA mixture by heating and stirring for 3h after cooling at 5 ℃. Scale bars are 100 um.

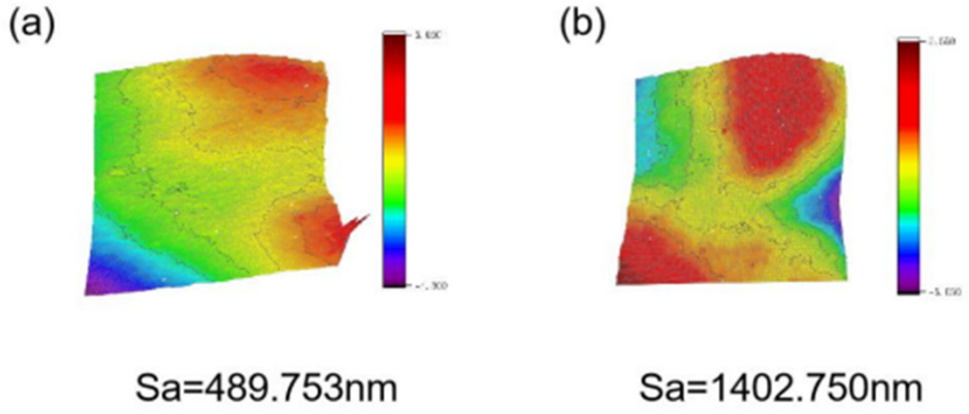


Fig S12. The surface height profile image of P-GO-PVA (a) and R-GO-PVA (b).

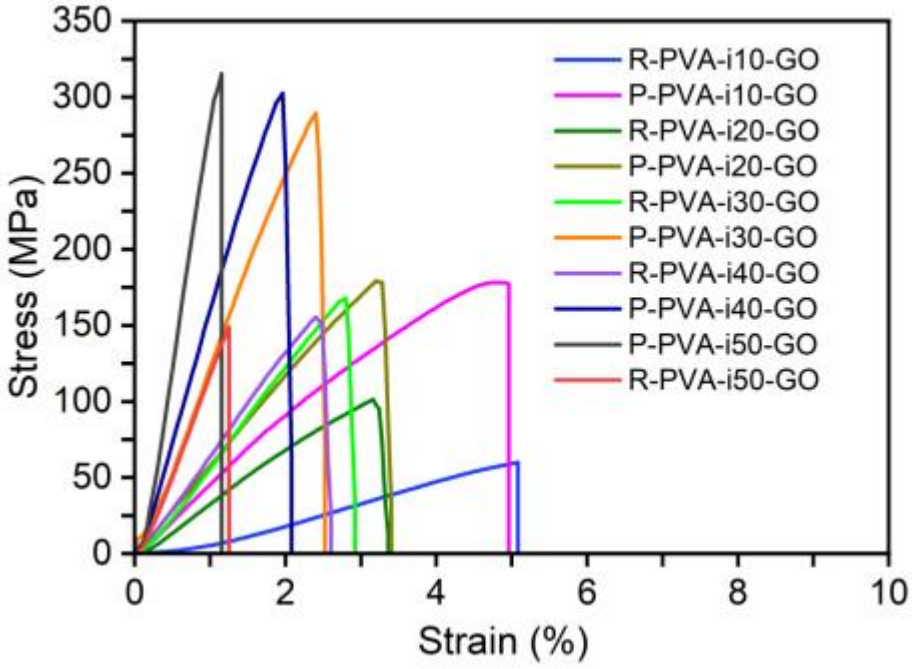


Fig S13. Stress−strain curves of P-GO-PVA and R-GO-PVA with different GO content in PVA.

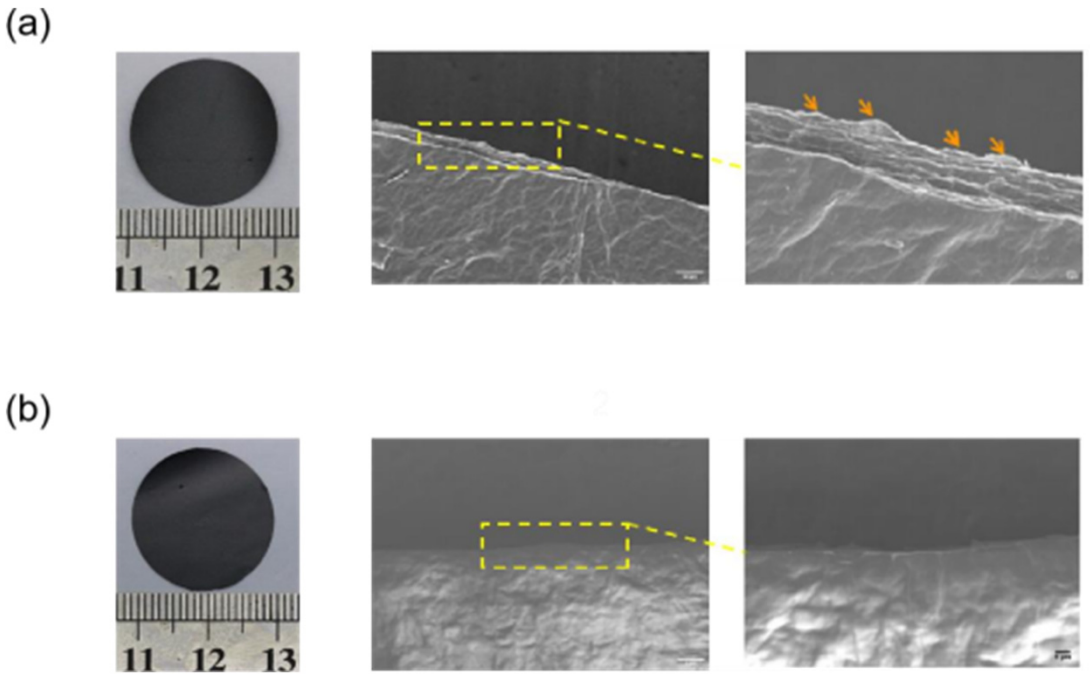


Fig S14. Digital photos and SEM images of transverse cross section of homogeneous GO-PVA-SiO_2 (a) and aggregated GO-PVA-SiO_2 (b).

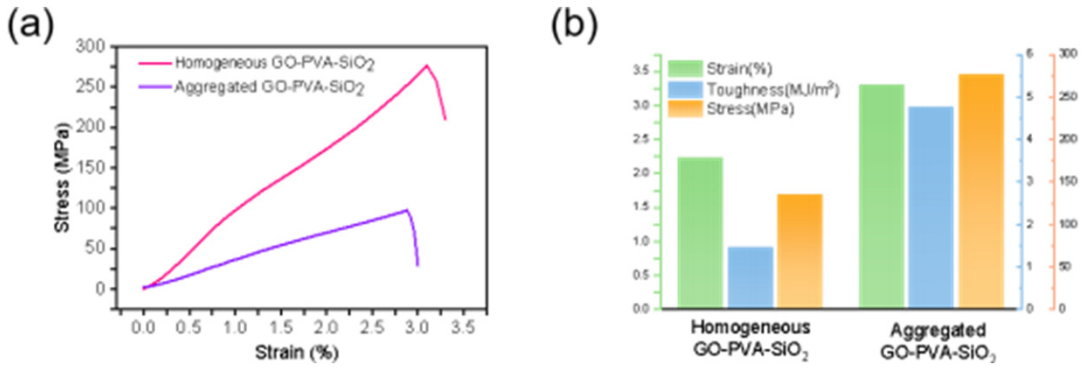


Fig S15. Typical stress−strain curves (a) and mechanical properties (b) of homogeneous GO-PVA-SiO_2 and aggregated GO-PVA-SiO_2.

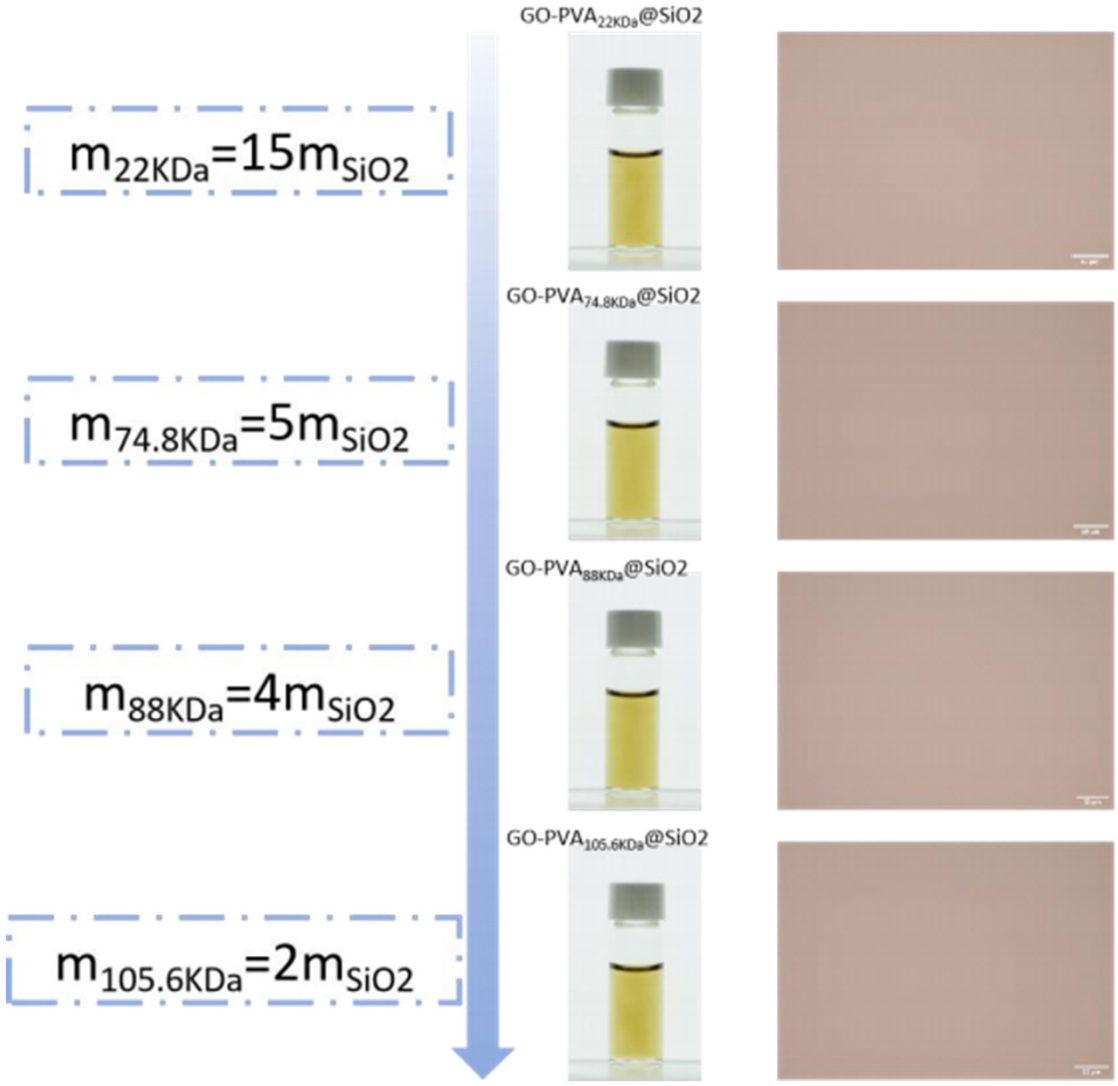


Fig S16. Digital and optical microscope images of homogeneous GO-PVA -SiO_2 dispersions with different molecular weight of PVA.

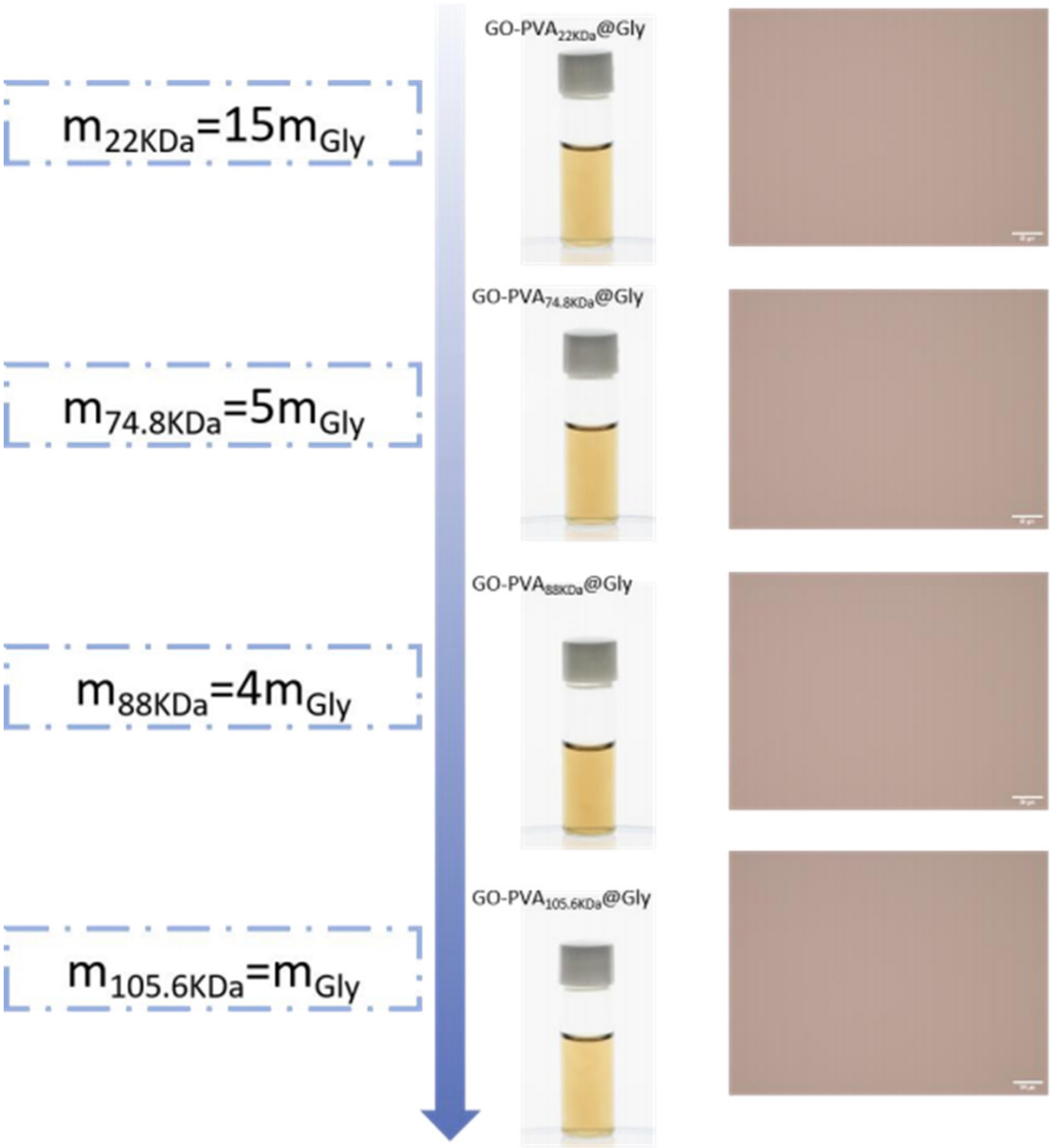


Fig S17. Digital and optical microscope images of homogeneous GO-PVA -Gly dispersions with different molecular weight of PVA.

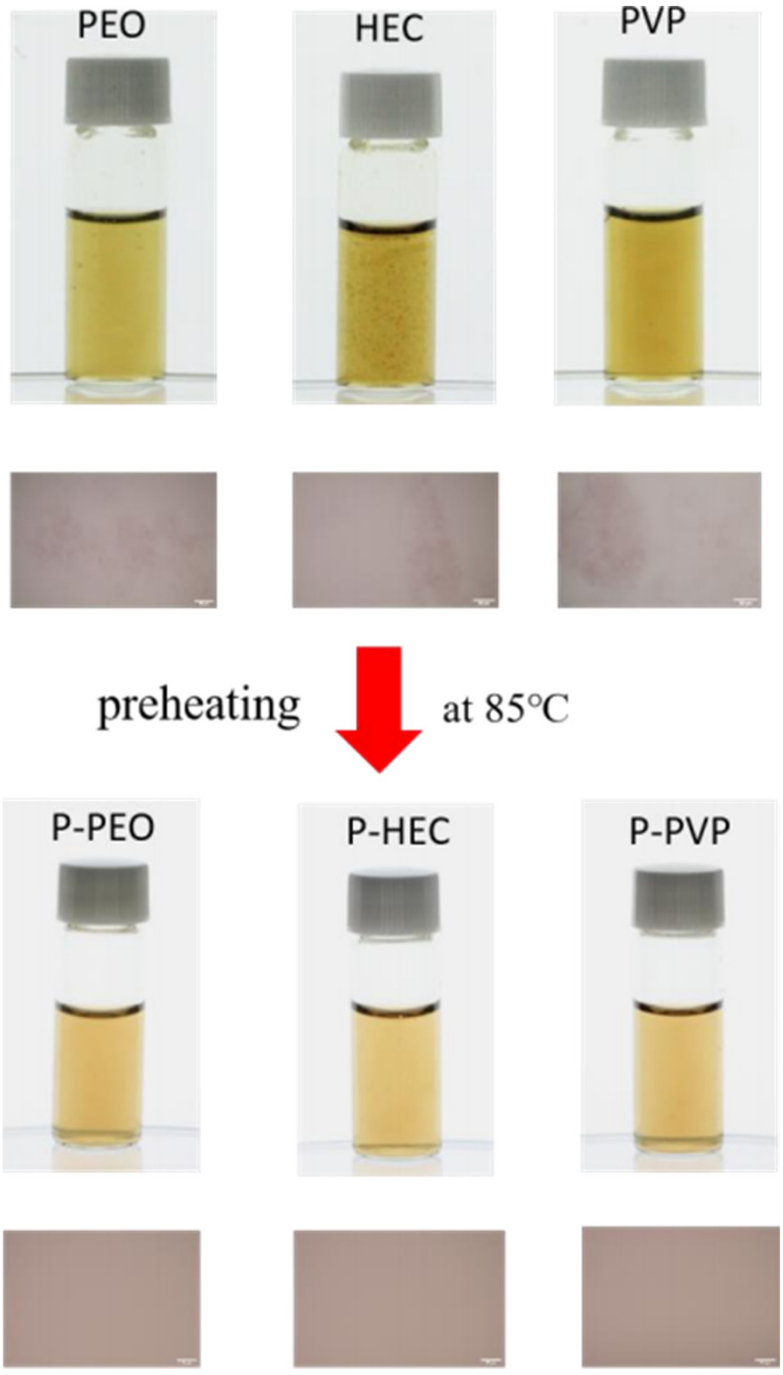


Fig S18. Digital and optical microscope images of GO-PEO, GO-HEC and GO-PVP dispersions before and after preheating at 85 ℃.

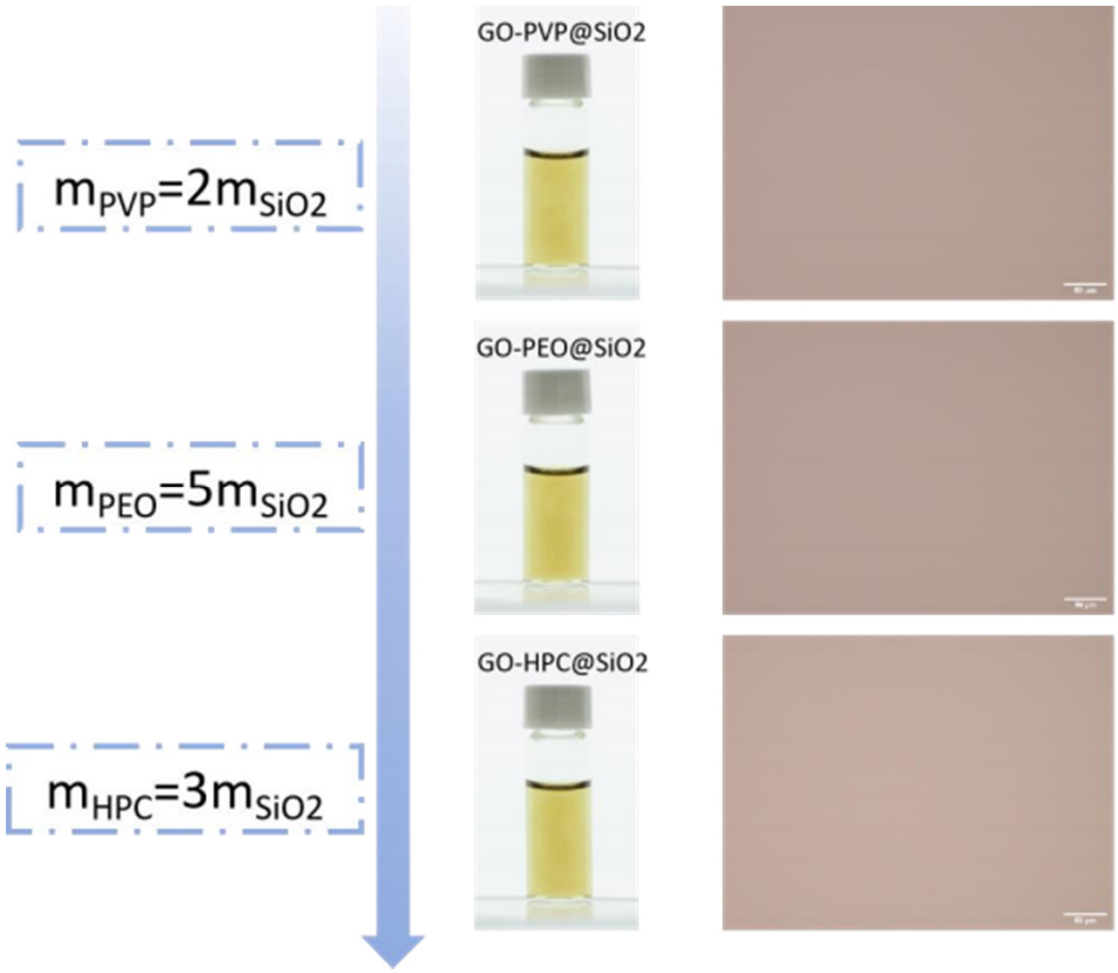


Fig S19. Digital and optical microscope images of homogeneous GO-PVP/PEO/HPC -SiO_2.

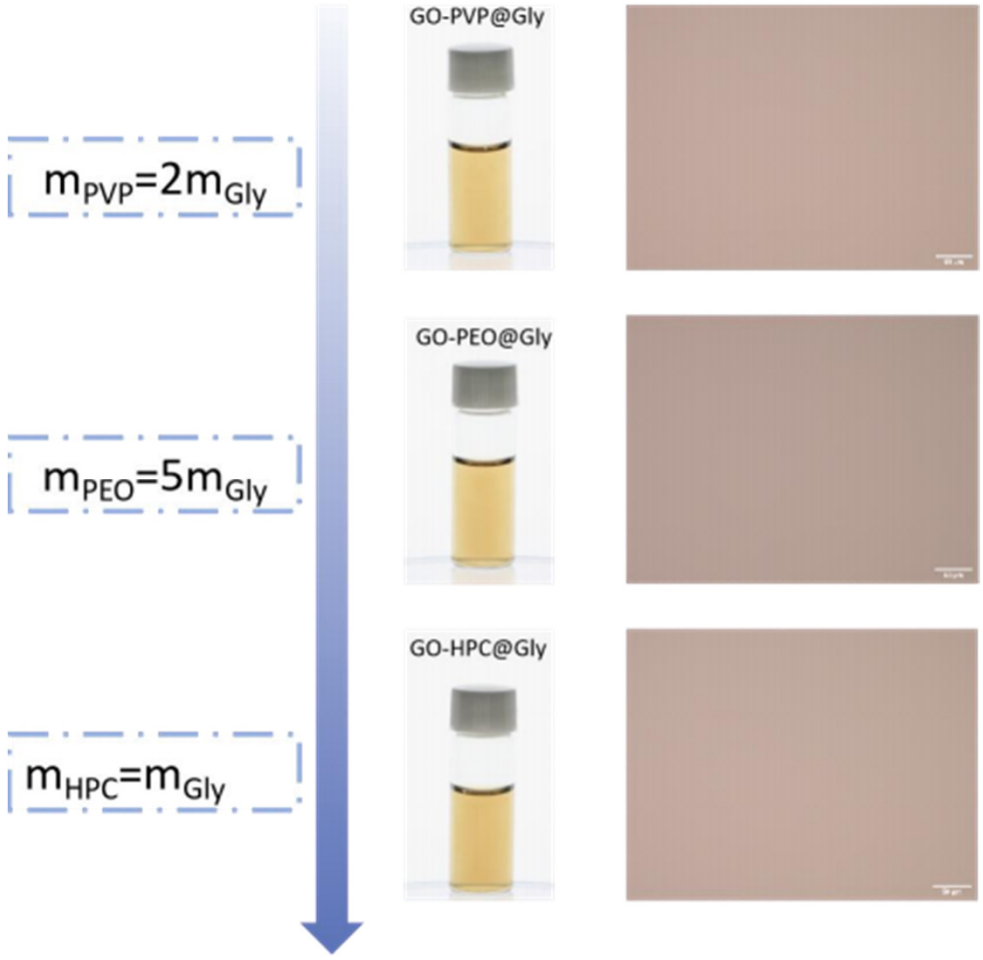


Fig S20. Digital and optical microscope images of homogeneous GO-PVP/PEO/HPC -Gly.

Table S1. The miscibility rule of GO and PVA over the concentrated range

C_{GO} (%)	C_{PVA} (%)			
	0.1	0.5	1	5
0.001	√	√	√	√
0.01	×	√	√	√
0.1	×	×	×	√
0.5	×	×	×	×
1	×	×	×	×

Notes: "√" means miscible and "×" means aggregated