Electronic Supplementary Material (ESI) for Soft Matter.

Influence of Graphene Oxide on Rheology, Mechanical, Dielectric, and Triboelectric Properties of Poly (vinyl alcohol) Nanocomposite Hydrogels Prepared via Facile One Step Process

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Supplementary Information

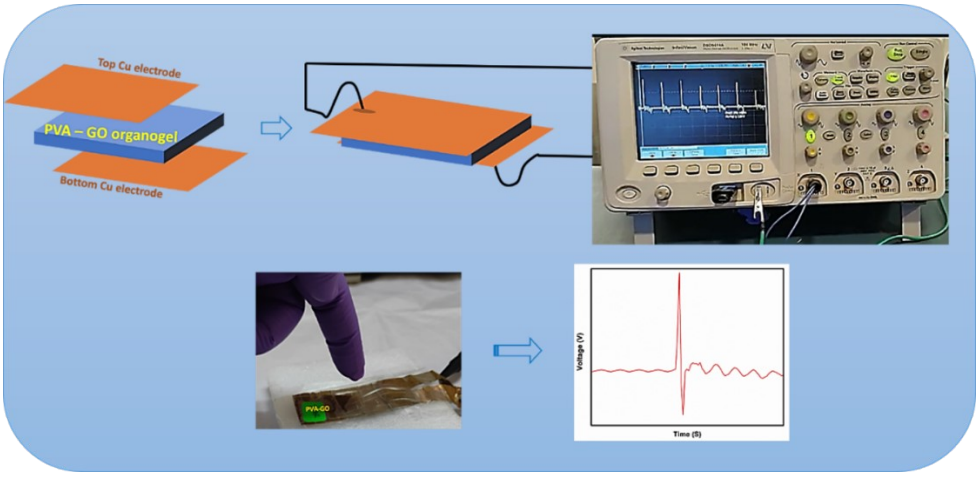

Fig. S1 A Schematic representation for the piezoelectric device setup.

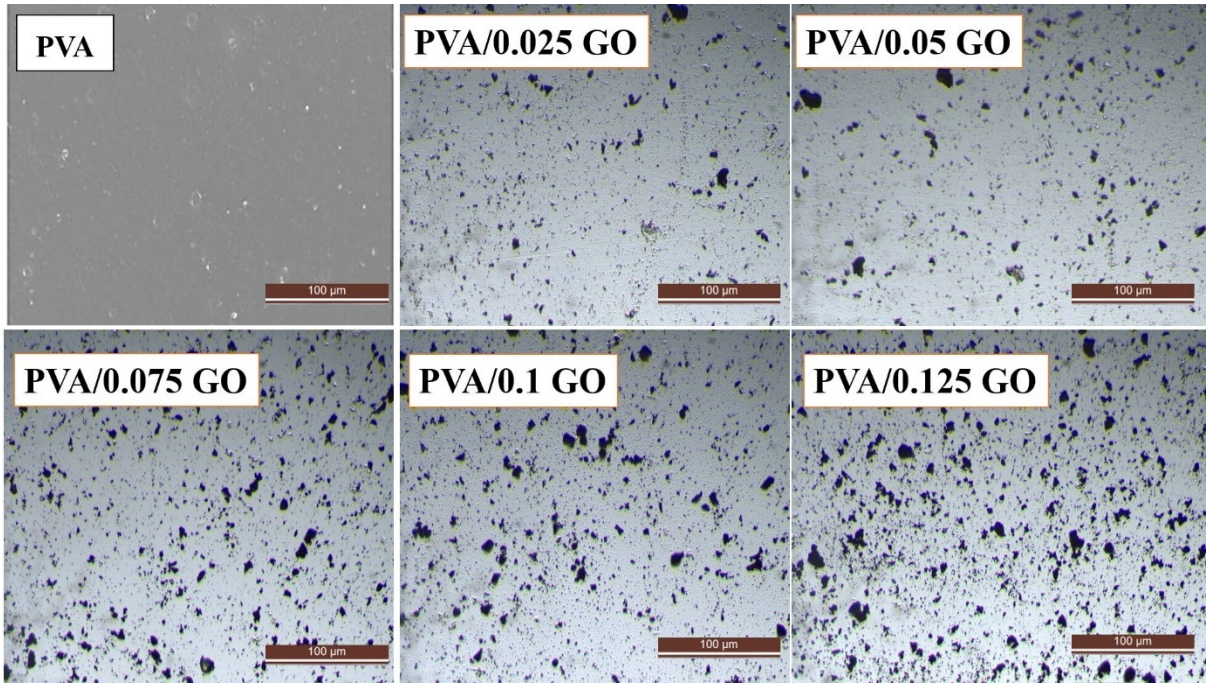

Fig. S2 (a) Optical microscopic images of pure PVA hydrogel and PVA/GO nanocomposite hydrogels of varying GO concentration (0.025 – 0.125 wt.%) depicting GO 'agglomerate' in PVA matrix.

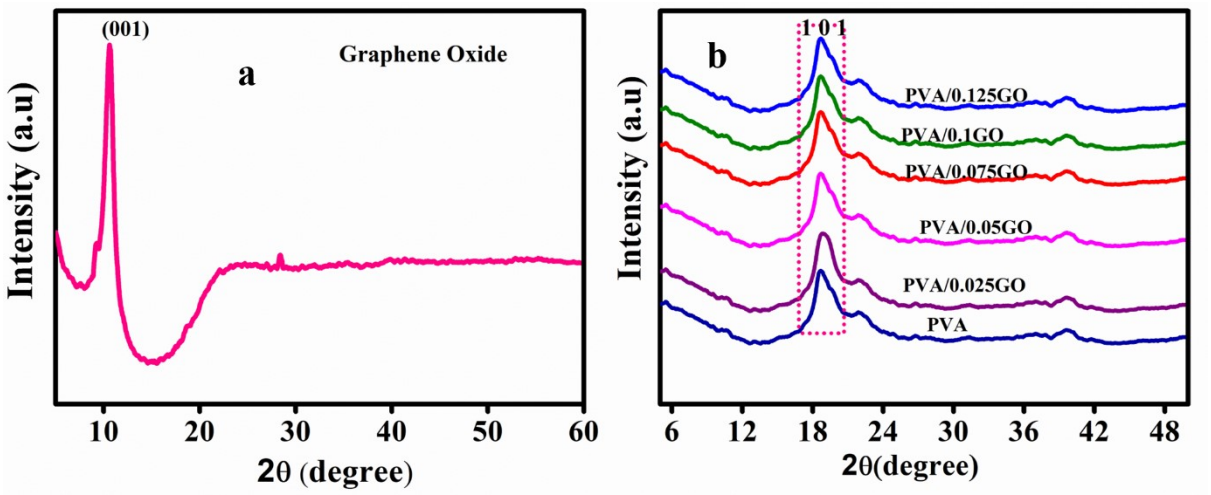

Fig. S3 (a) WAXD patterns of pristine GO, (b) neat PVA and PVA/GO nanocomposite hydrogels with different concentration of GO.

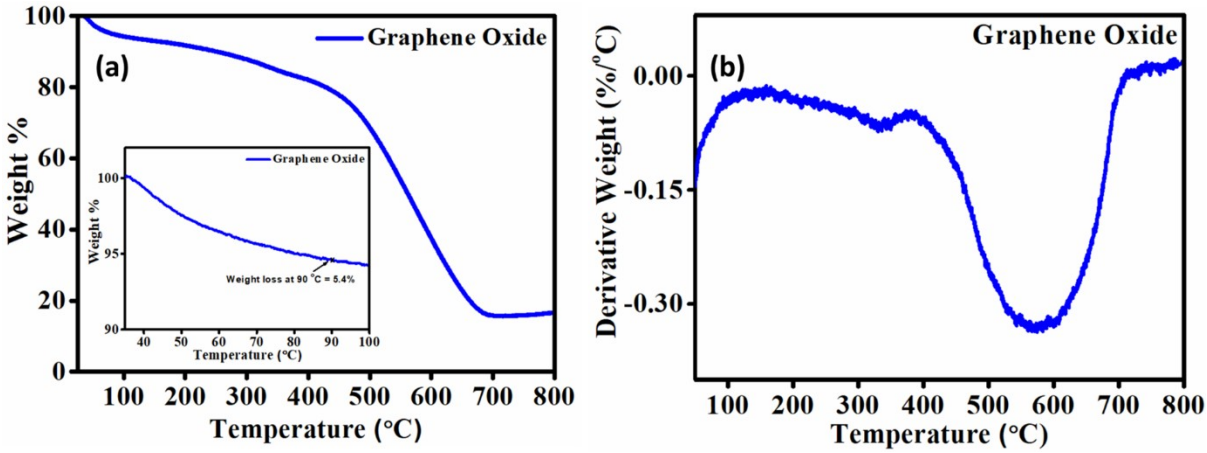

Fig. S4 TGA and DTGA plots of pristine graphene oxide in the range of 30 - 800 °C

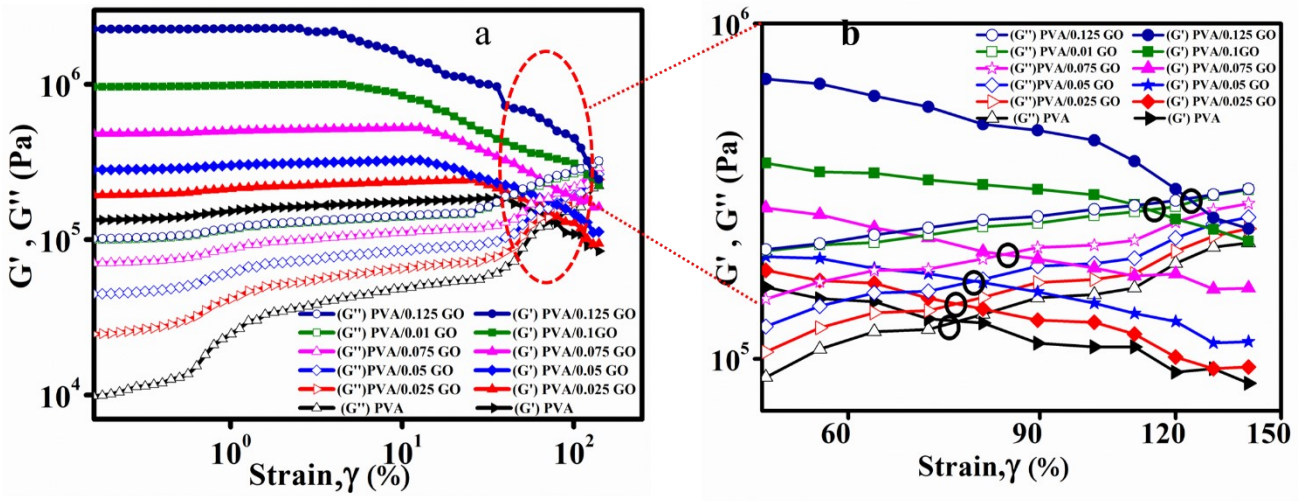

Fig. S5 Amplitude sweep at 1Hz of PVA/GO nanocomposite hydrogel with varying concentration of GO.

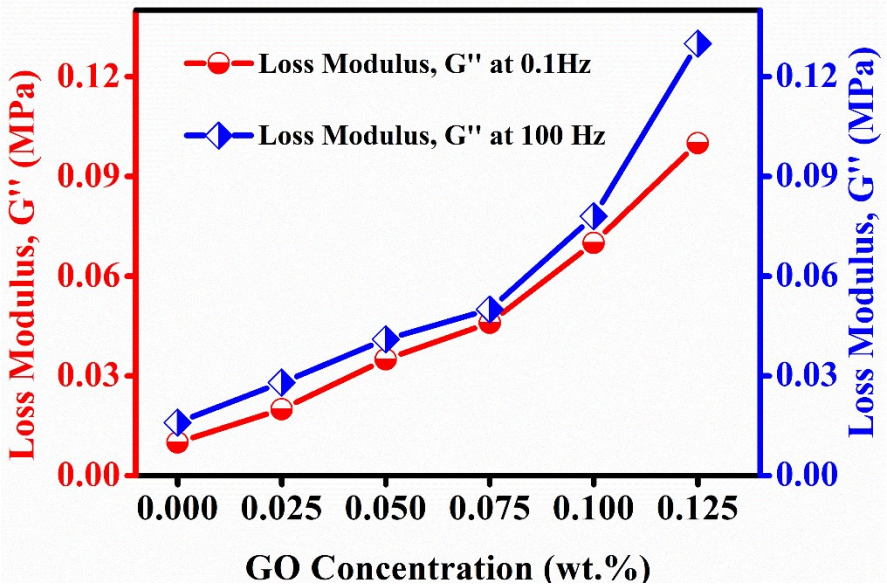

Fig. S6 Loss modulus versus GO concentration of PVA/GO nanocomposite hydrogel at 0.1 and 100 Hz during frequency sweep.

Table S1 The melting and crystallization parameters of PVA/GO nanocomposite hydrogel with different concentration of GO

GO (wt.%)	T_m (°C)	T_c (°C)	ΔH_m (J/g)	Crystallinity (%)
PVA	219	197.2	15.1	12.6
PVA/0.025GO	222	199.5	16.2	14
PVA/0.05GO	223.4	200.5	16.4	14.5
PVA/0.075GO	224.0	202.3	17	15.7
PVA/0.1GO	225.9	203.3	18.1	17
PVA/0.125GO	226.1	206.4	21.5	20.8

Table S2 The value of G' and G" at 0.1 and 100 Hz frequency during frequency sweep of PVA/GO nanocomposite hydrogel of varying GO concentration

Sample	**G' (MPa) at 0.1Hz**	**G' (MPa) at 100Hz**	**G" (MPa) at 0.1Hz**	**G" (MPa) at 100Hz**
PVA	0.13	0.26	0.01	0.02
PVA/0.025GO	0.18	0.30	0.02	0.03
PVA/0.05GO	0.23	0.36	0.03	0.04
PVA/0.075GO	0.29	0.41	0.04	0.05
PVA/0.1GO	0.48	0.61	0.07	0.08
PVA/0.125GO	0.63	0.71	0.09	0.12

Table S3 Nanoindentation analysis of PVA/GO nanocomposite hydrogel with different concentration of GO

Samples	Hardness (MPa)	Young's Modulus (MPa)
Pristine PVA	14.2	122
PVA/0.025 GO	16.4	128
PVA/0.05 GO	27.4	168
PVA/0.075 GO	34.3	195
PVA/0.1 GO	40.4	214
PVA/0.125 GO	46.5	226

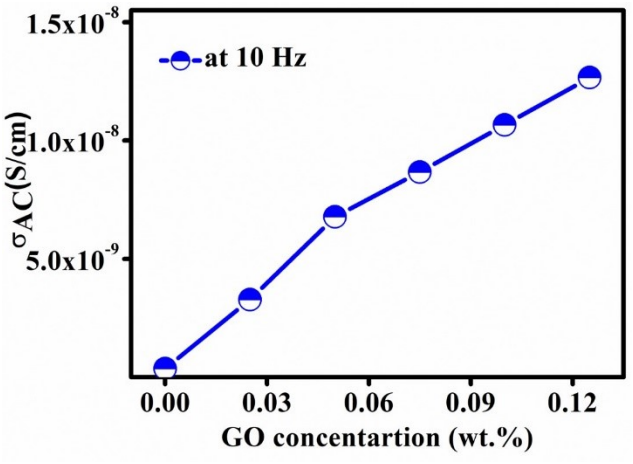

Fig. S7 AC conductivity of PVA/GO nanocomposite hydrogel at 10 Hz frequency as a function of GO concentration at room temperature.