Supporting Information

Fig. S1 shows the XRD patterns of PVA/GO nanocomposites with different GO weight loadings. The typical diffraction peak of pure PVA is observed at 2θ =19.6°. After GO is dispersed into the PVA matrix, the XRD pattern of the PVA/GO nanocomposite exhibits the same peak as that of pure PVA. In addition, the main peak at 19.4° decreased, showing a decrease in crystallinity and supporting the hypothesis for the existence of some interaction between PVA and GO to the detriment of interactions among polymer chains.

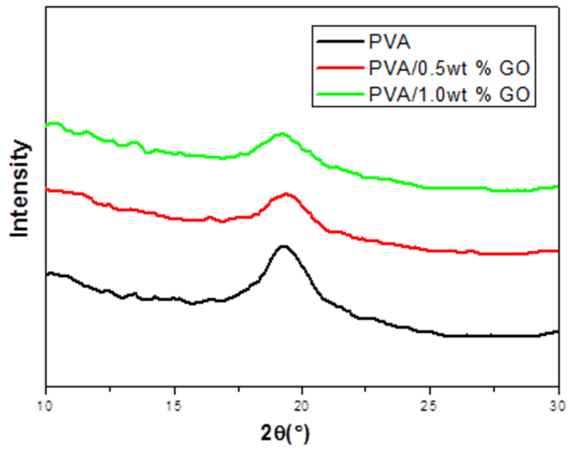

Fig S1. XRD result of PVA/GO nanocomposites with different GO weight loadings.

Fig. S2 shows the comparison of shape change between the unswollen and swollen samples. After being immersed into water for 60s at 25 °C, a noticeable expansion in volume was found along with the shape change in PVA/0.5wt% GO strip. Finally, the dimensions of the specimen were stretched from 50×3×0.1 mm to 65×5×0.13 mm.

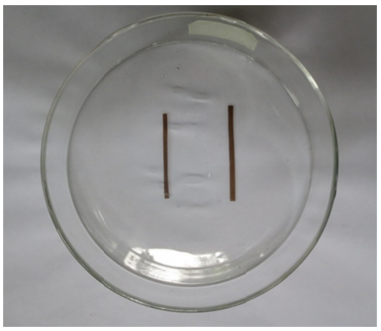

Fig S2. Picture of the unswollen and swollen PVA/0.5wt% GO film.

TGA is used to characterize the thermal properties of PVA and PVA/GO nanocomposites. Both pure PVA and its nanocomposite decompose in a two-step process, and the TGA curve of PVA/GO nanocomposite was shifted toward a higher temperature as compared to that of pure PVA. The onset temperature of degradation for the nanocomposite was about 5 °C higher at 0.5 wt% GO loading. These phenomena have been ascribed to the stability of the hydrogen bondings between PVA and GO, which improves the thermal stability of PVA.

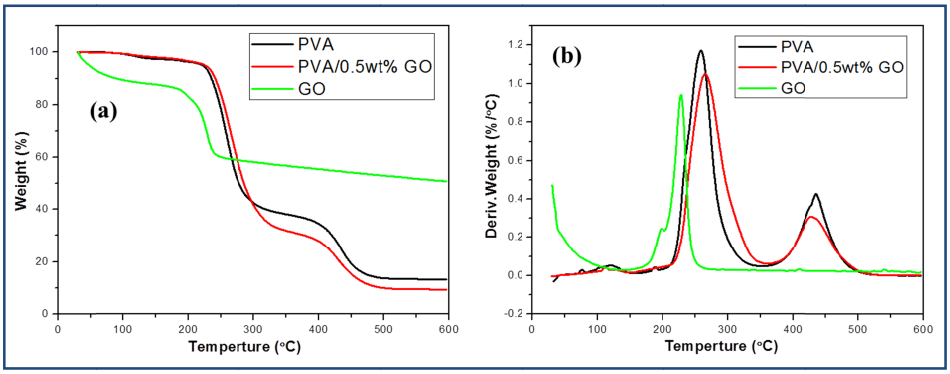

Fig S3. (a) TGA curves of GO, PVA and PVA/0.5wt% GO nanocomposites and (b) corresponding DTG curves of GO, PVA and PVA/0.5wt% GO nanocomposites.

A very important question in solvent-induced SMPs is whether the SMPs can be reversed back to the original value of a dry condition by dehydrating. Fig. S4 show that PVA/GO strip keeps good shape memory behavior in the second cycle application. It can be seen that the percentage of shape recovery reaches nearly 100%.

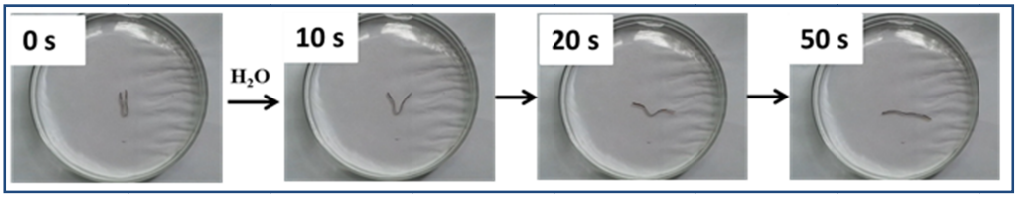

Fig S4. Second shape recovery cycle of a PVA/0.5wt% GO sample actuated by room temperature water.

In order to check whether the glass transition temperature is thermally reversible, the PVA/0.5wt% GO samples (after being immersed in water for 60s) were placed in an oven at 30 °C for 1h and 24h. DMA results reveal the storage modulus and Tg gradually approach its original values with the increase of time placed in air. The increase is more significant in the sample rested for 24h, which almost

coincides with the dry PVA/0.5wt% GO sample, in which the evaporation of water takes place. Therefore, it can be concluded that moisture has a strong influence on the Tg of the PVA/GO SMPs and this SMPs is thermally reversible.

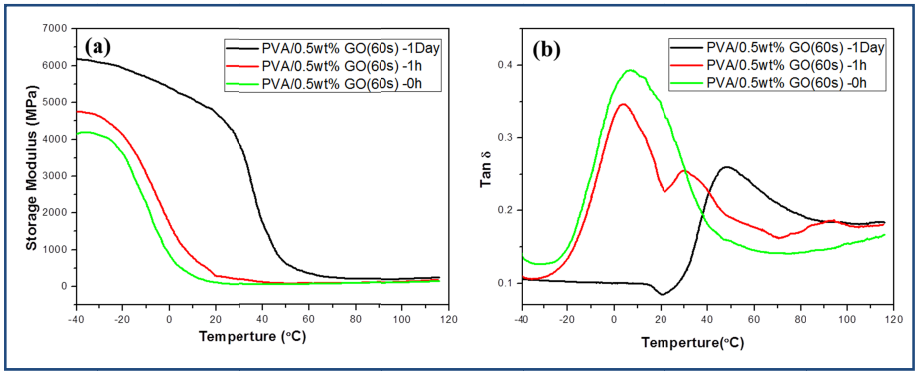

Fig S5. DMA results of PVA/0.5wt% GO sample (immersed in water for 60s) after rested in air for different times. (a) Storage modulus, (b) Tan δ.