Supporting Information

Reversible Adhesion via Light-Regulated Conformations of Rubber Chains

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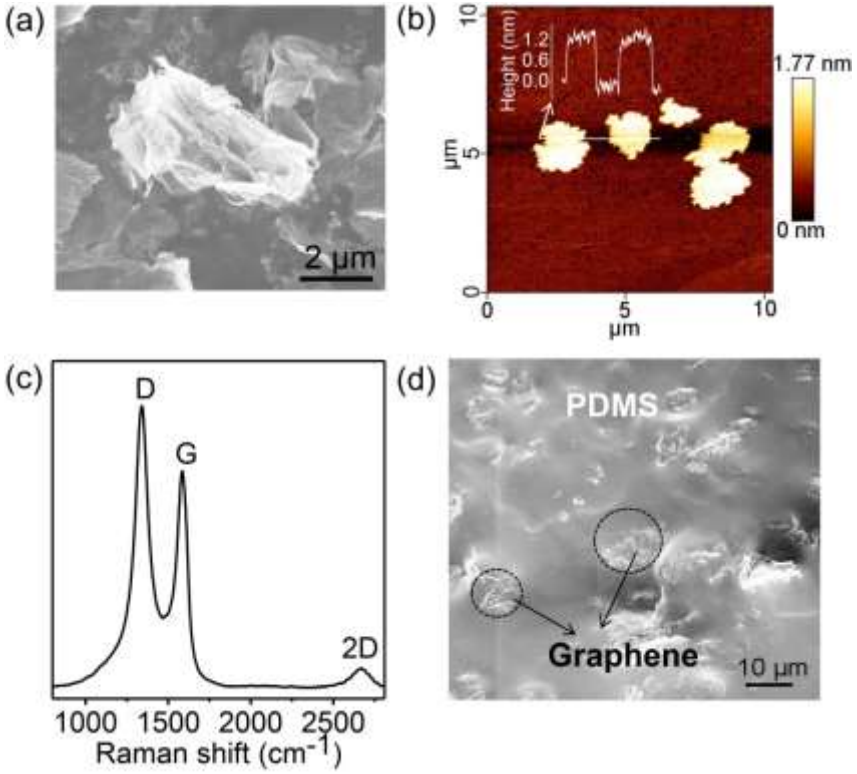

Figure S1. Characterization of graphene sheet and the mixture of PDMS and graphene sheets (GP). (a) SEM, (b) AFM and (c) Raman spectrum of graphene sheets. Inset in (b) shows the thickness profile of graphene sheet. (d) SEM image of GP. The dash circles mark the positions of graphene sheets while the rest flat area is the PDMS matrix.

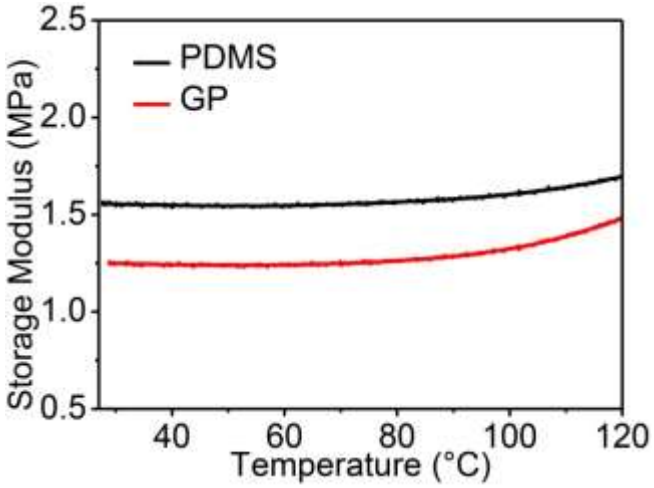

Figure S2. Dependences of elastic modulus of PDMS and GP (0.8 wt % of graphene in GP) with temperature ranging from RT to 120 ºC.

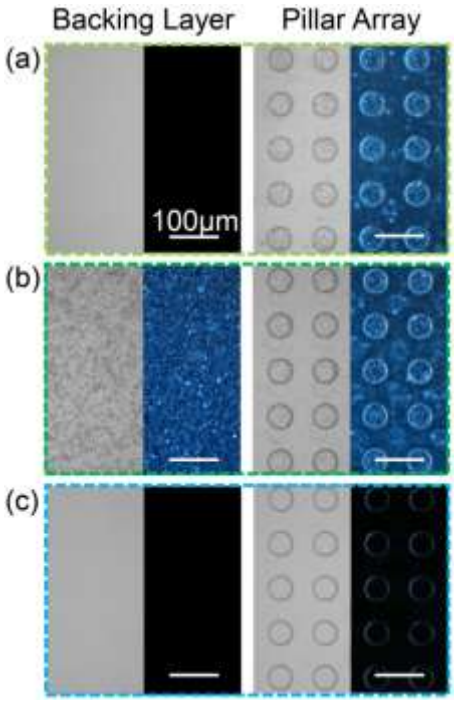

Figure S3. Optical image of the backing layer and the pillar array of (a) B_PP_G, (b) B_GP_G and (c) B_PP_P under light filed (left) and dark-field (right) illuminations.

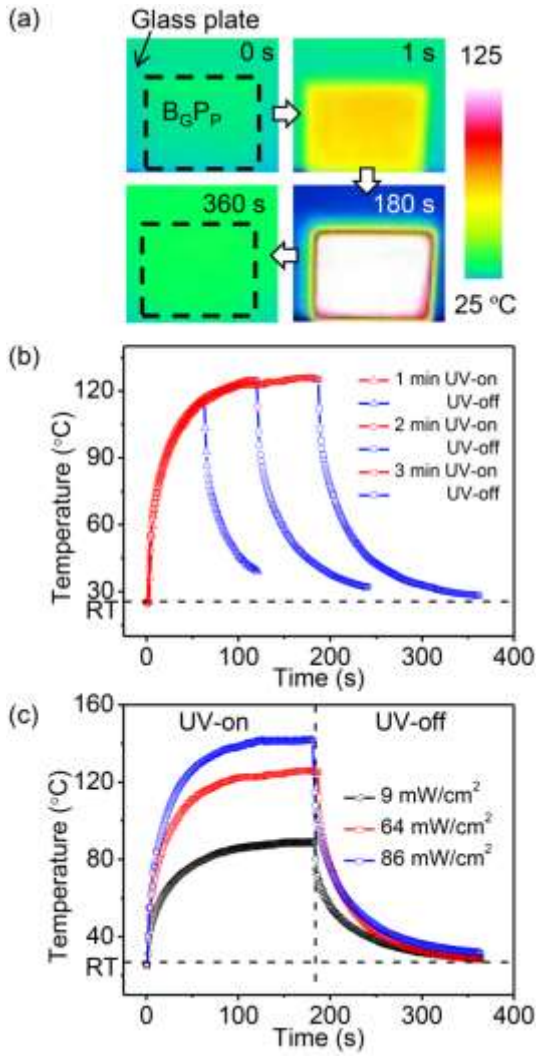

Figure S4 (a) Infrared images of B_GP_P under UV irradiation with 3 min UV irradiation and 3 min UV-off. (b-c) Dependence of UV-induced temperature change at the centre of the B_GP_P on (b) the period of on-off cycles and (c) the light intensity. The light intensity in (a) and (b) is 64 mW/cm^2.

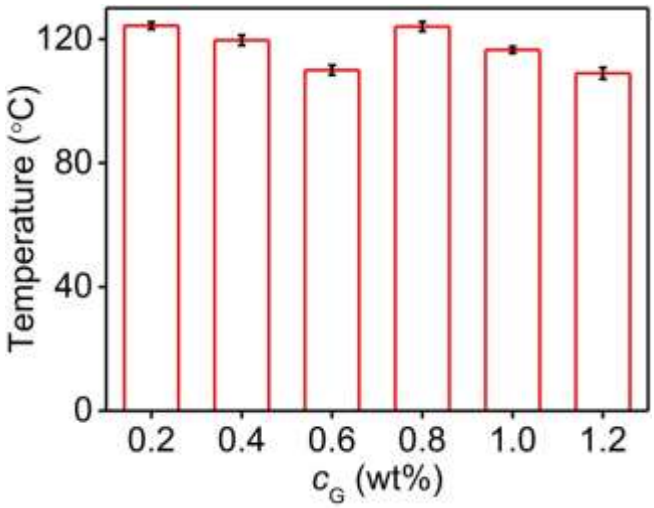

Figure S5. Dependence of temperatures of B_GP_P at the UV-on state on the concentration of graphene (c_G) in GP. Error bars indicate the standard deviation.

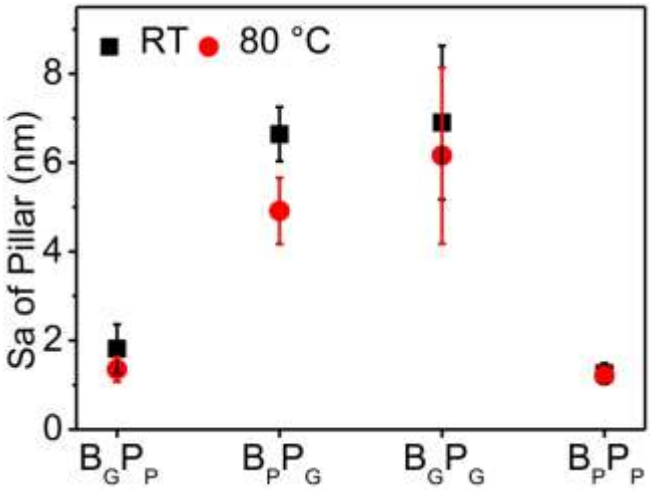

Figure S6. *Sa* roughness of pillar tip on different adhesives at RT and 80 ºC. Error bars indicate the standard deviation.

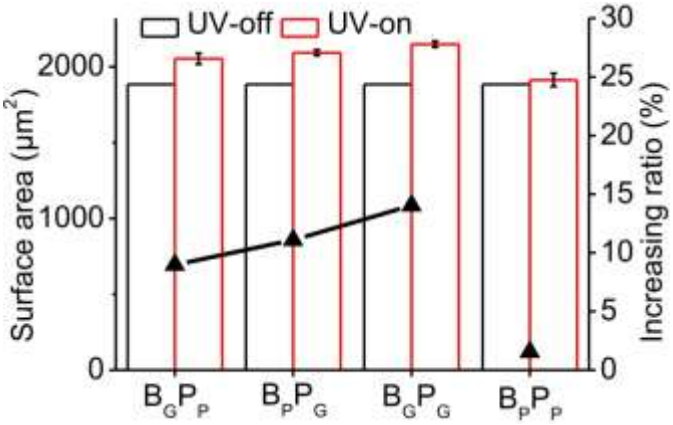

Figure S7. Surface areas of pillar tip in different adhesives under UV on and off states. Error bars indicate the standard deviation.

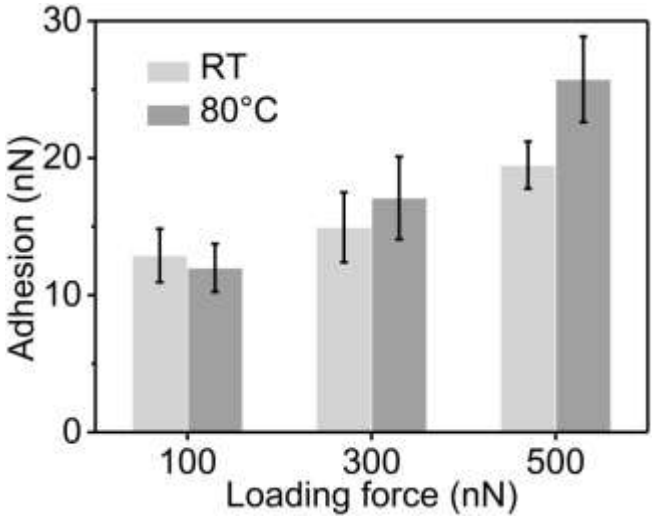

Figure S8. Nanoscale adhesion of PDMS surface with different loading forces. The mixing ratio of PDMS is 10:1. Error bars indicate the standard deviation.

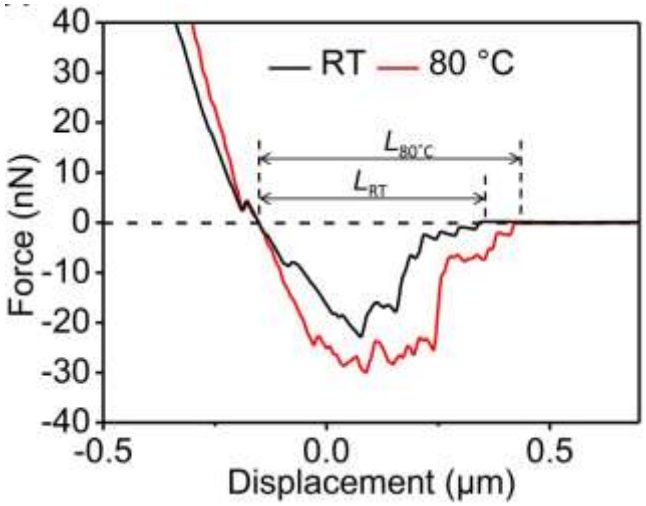

Figure S9. Retraction curve of PDMS measured with AFM at RT and 80 ºC. Detaching distance (*L*) at RT and 80 ºC are indicated.

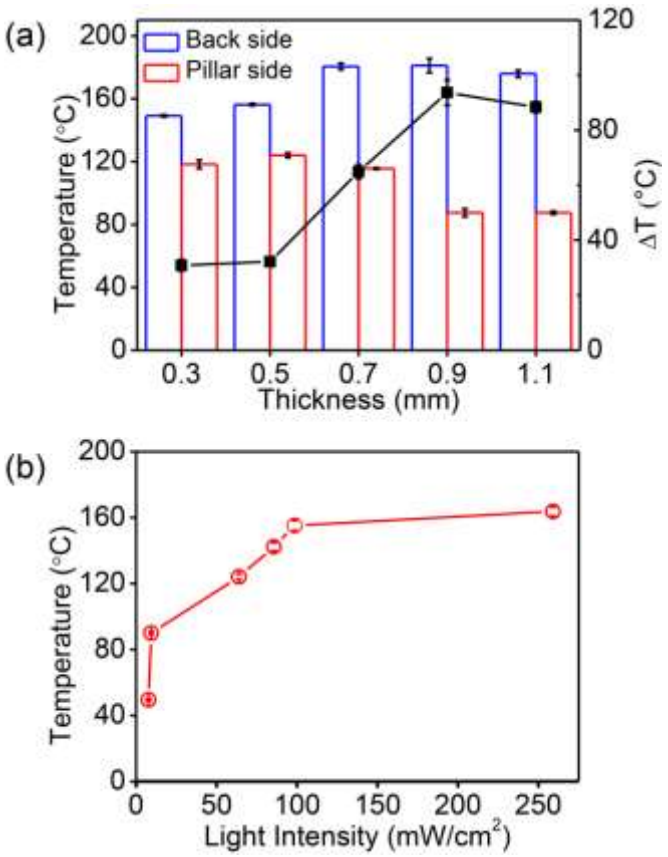

Figure S10. (a) Dependence of temperatures of both sides of B_GP_P under UV irradiation on the thickness of B_GP_P. (b) Dependence of temperature of B_GP_P at the UV-on state on the intensity of UV light. Error bars in (a) and (b) indicate the standard deviation.

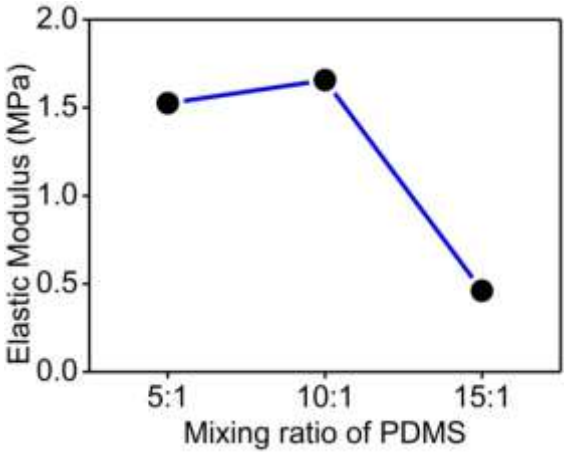

Figure S11. Dependence of elastic modulus of PDMS on the mixing ratio of base to cross-linker for PDMS.