Electronic Supplementary Material (ESI) for Nanoscale.

Supporting Information

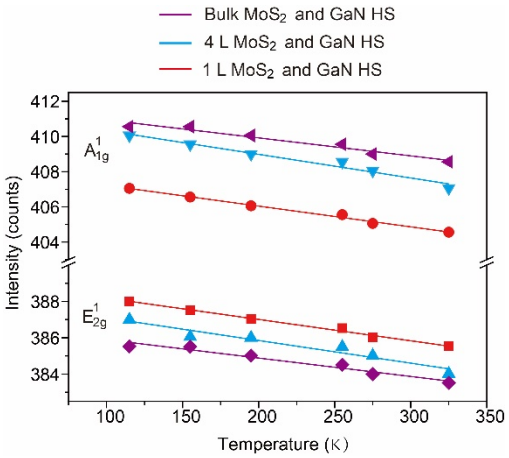

Figure S1. Temperature dependence of MoS_2 Raman active E_{2g} and A_{1g} modes for different MoS_2/GaN heterostructures. With the increase in temperature, both the frequencies of the E_{2g} and A_{1g} modes gradually decreases. This is mainly ascribed to thermal expansion and temperature-induced anharmonicity.

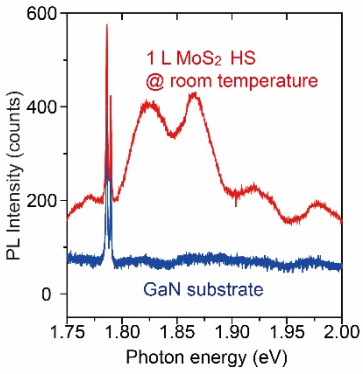

Figure S2. PL spectra of GaN substrates in the range of 1.75-2.0 eV (blue line). For comparison, the PL emission peak from monolayer-MoS_2/GaN heterostructures is plotted (red line). It's apparent that the peak at 1.78 eV comes from the sapphire substrate.

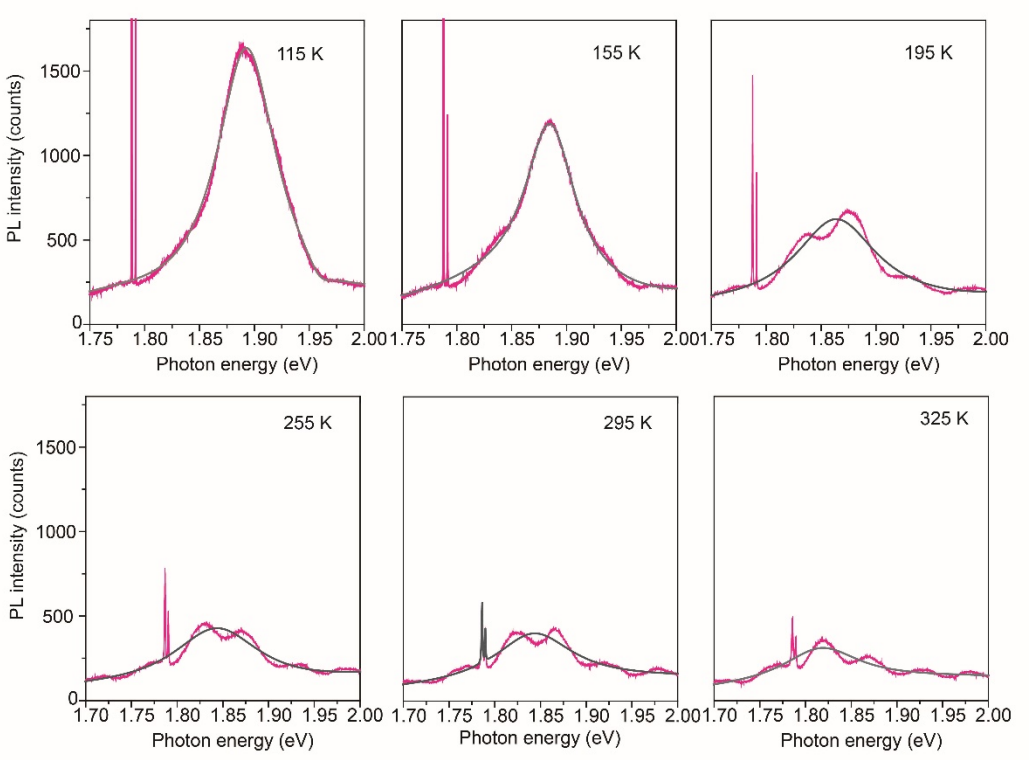

Figure S3. Fitting curves for the PL spectra of monolayer-MoS_2/GaN heterostructures under different temperatures as plotted by the grey lines.

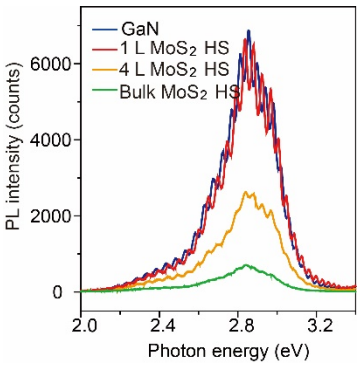

Figure S4. Comparison of PL spectra in the range of 2.0~3.4 eV for different configurations. With the increase of MoS_2 thicknesses in the heterostructures, the corresponding peak intensity decreases due to the decreased laser power that was incident on GaN.

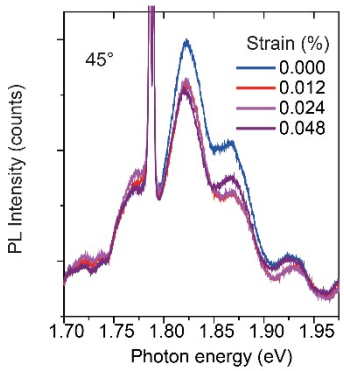

Figure S5. PL spectra of monolayer-MoS_2/GaN heterostructures at the strain direction of 45°. The fitting peak intensity was derived and plotted as a function of tensile strains as indicated in Figure 3e (main text).

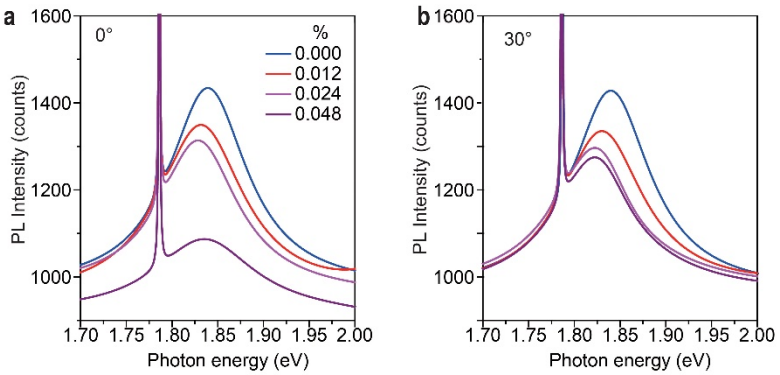

Figure S6. The fitting curves for the tensile strain dependence of PL intensity along 0° (a) and 30° (b) in the main text (Figures 3c and d). With the tensile strain increasing, the PL intensity decreases, and the PL emission peak shows a slight redshift.

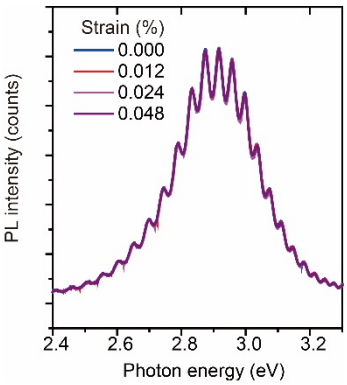

Figure S7. PL spectra under different tensile strains for a separate GaN film. The applied strains have no obvious influence on the emission peak.

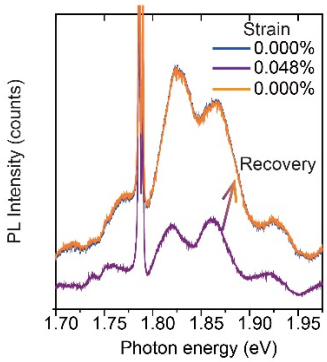

Figure S8. PL spectra for monolayer-MoS_2/GaN heterostructures under different applied strains to elucidate the recovery property.