Supplementary Information

Gigantic photostriction effect in monolayer semiconductors

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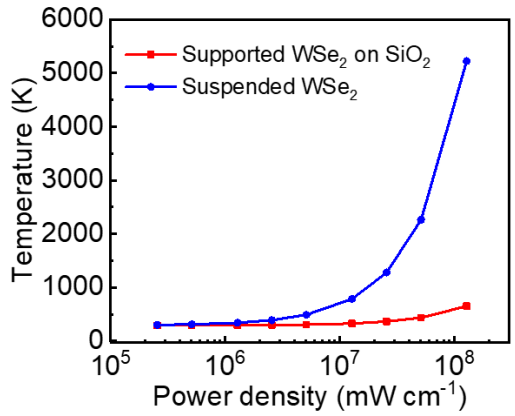
Simulation of temperature change of WSe_2 under laser illumination

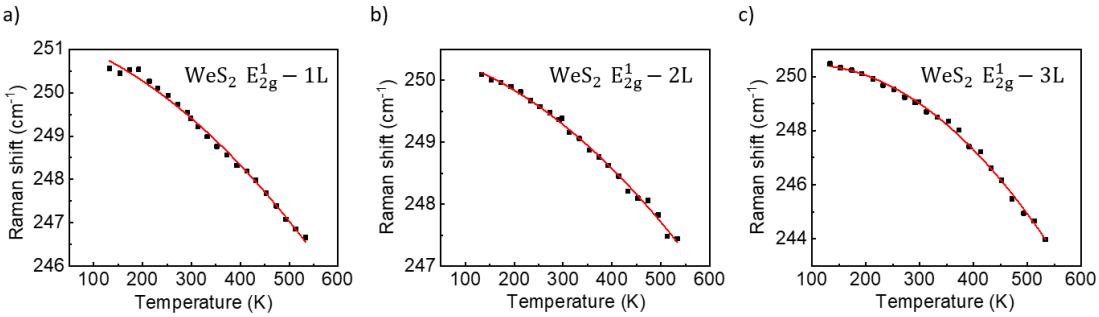
In order to estimate the change in temperature as the monolayer WSe_2 is exposed under laser illumination, we conduct a temperature simulation via COMSOL software. Fig. S1 shows the temperature of the monolayer WSe_2 on SiO_2 substrate increased from 293K to 366K with increasing absorbed power from 1.3 x 10^5 mW cm^{-2} to 18.8 x 10^6 mW cm^{-2}.



Supplementary Figure 1. Temperatures variation of monolayer WSe_2 with increasing absorbed light power from 1.3 x 10^5 mW cm^{-2} to 18.8 x 10^6 mW cm^{-2}.

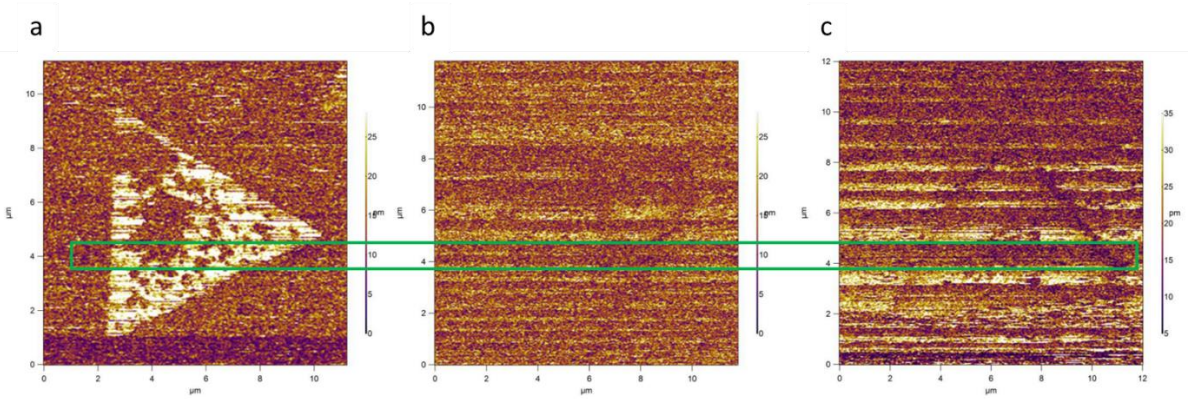
Temperature-dependent Raman shift

Based on the experiment data, combining with the temperature simulation result, we use polynomial fitting to predict the heat induced Raman shift. Fig. S2 shows the fitting result of 1L, 2L, 3L WSe_2 respectively.



Supplementary Figure 2. E^1_{2g} Raman peak shift of monolayer, 2L, and 3L under different temperatures.

Inverse piezoelectric characterization by PFM



Supplementary Figure 3. PFM mapping outlined by green is the part shown in the manuscript. The data shows the odd-even-layer-dependent PFM responses.