Electronic Supplementary Material (ESI) for Nanoscale.

Supporting Information

Enhanced exciton emission behaviors and tunable band gap of ternary $W(S_xSe_{1-x})_2$ monolayer: Temperature dependent optical evidence and first-principles calculations

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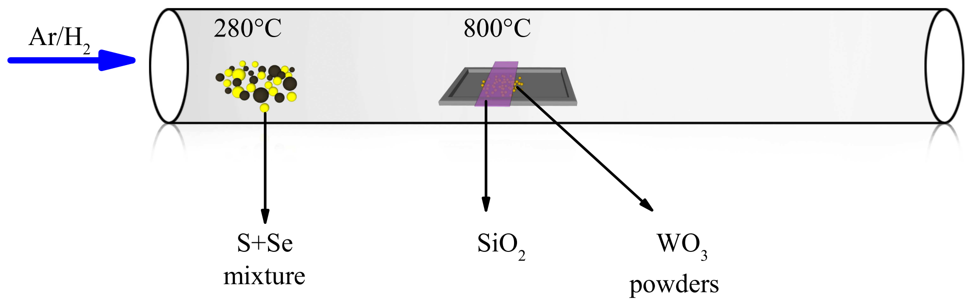

Fig. S 1: Schematic illustration of the CVD growth for $W(S_xSe_{1-x})_2$ alloy nanosheets.

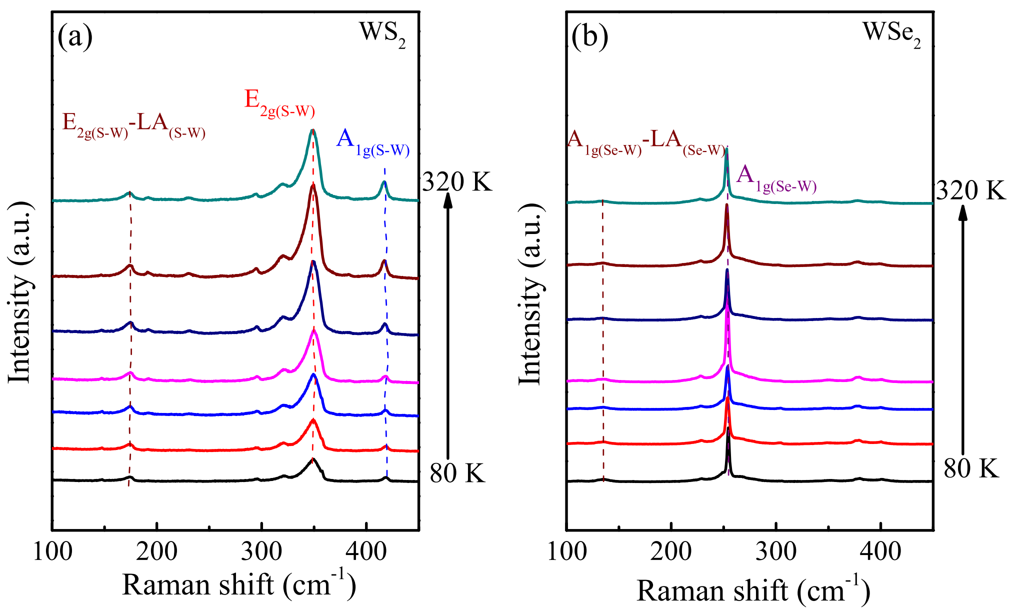

Fig. S 2: Raman spectra as a function of temperature for a chemical vapor deposited single layer (a) WS_2, and (b) WSe_2, respectively.

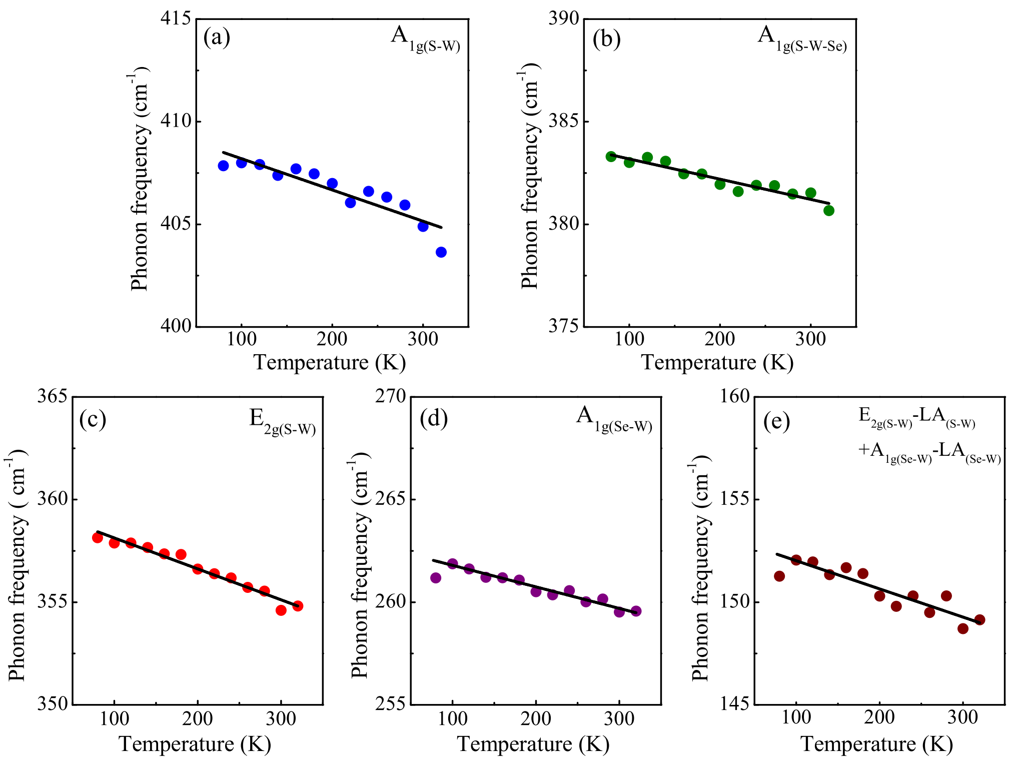

Fig. S 3: Phonon frequency of five main vibrational modes as a function of temperature for monolayer $W(S_{0.5}Se_{0.5})_2$ nanosheets.

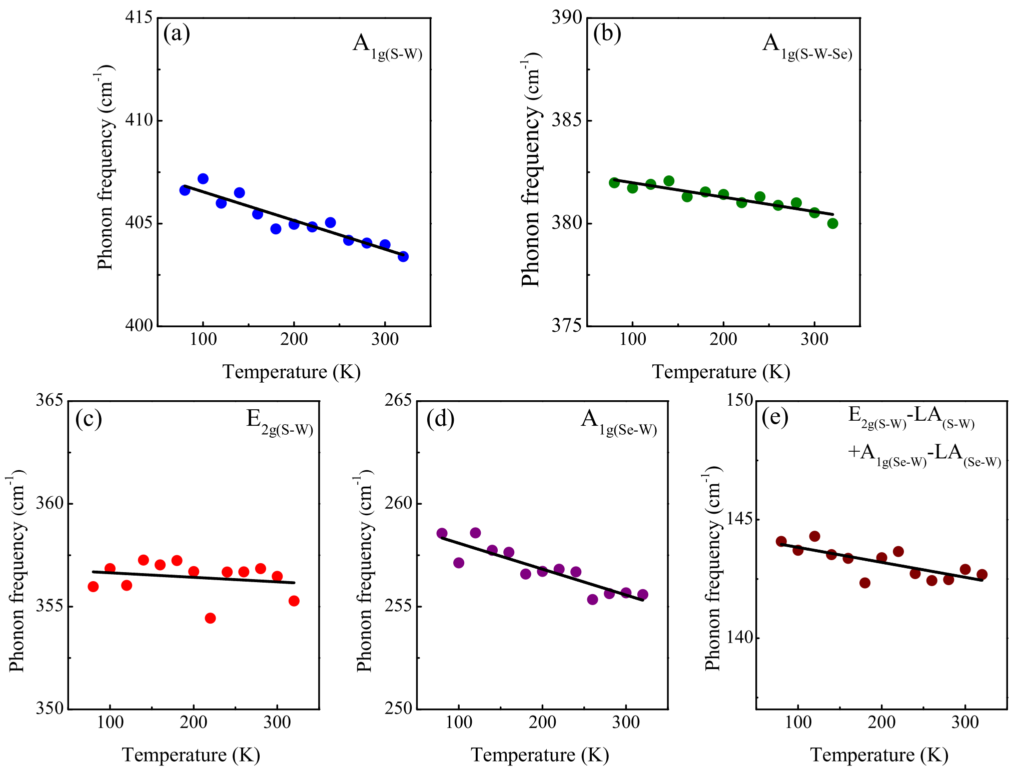

Fig. S 4: Phonon frequency of five main vibrational modes as a function of temperature for monolayer $W(S_{0.3}Se_{0.7})_2$ nanosheets.

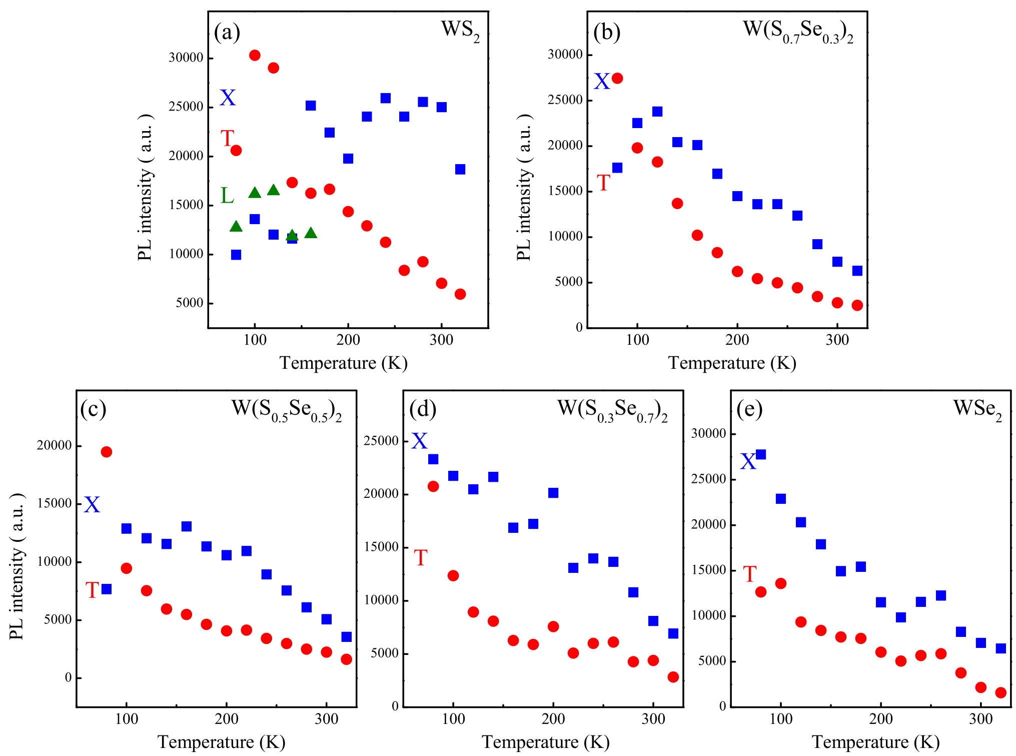

Fig. S 5: The PL intensities of the exciton (X) and trion (T) emissions as a function of temperature for monolayer alloy nanosheets: (a) WS_2, (b) $W(S_{0.7}Se_{0.3})_2$, (c) $W(S_{0.5}Se_{0.5})_2$, (d) $W(S_{0.3}Se_{0.7})_2$ and (e) WSe_2, respectively.