

Supplementary Information

Unveiling exceptional valley contrast in AA- and AB-stacked bilayer WS₂

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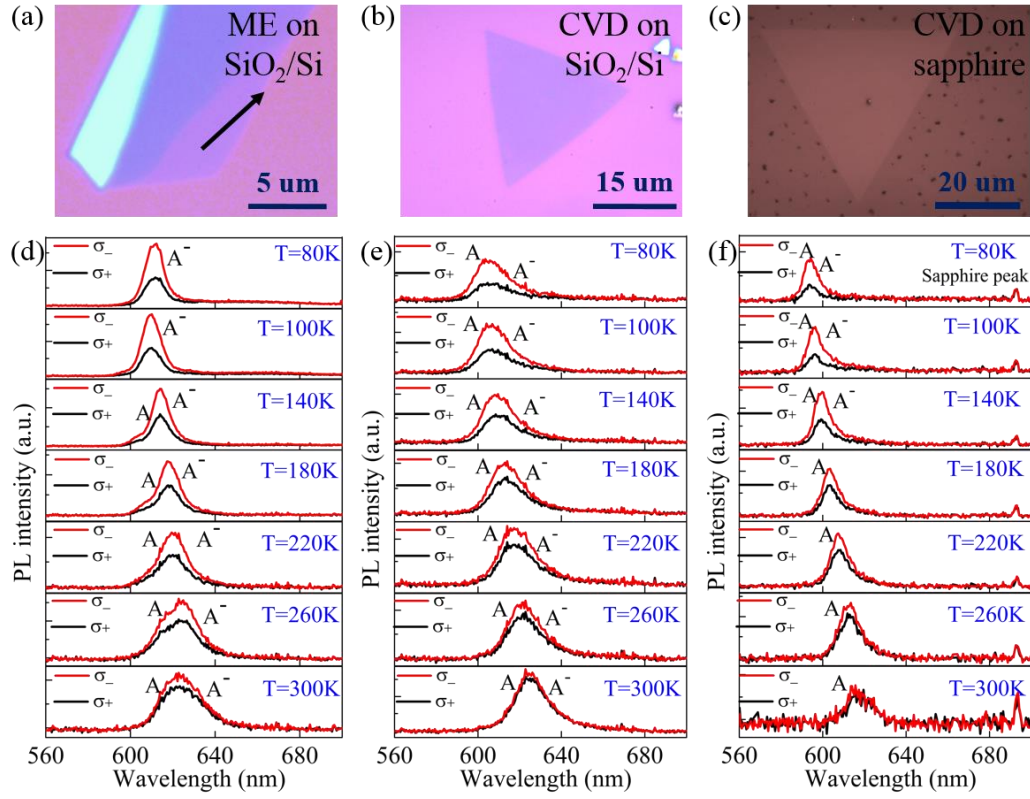


Fig. S1 Optical images of (a) ME and (b) CVD-grown monolayer WS_2 on SiO_2/Si substrate and (c) CVD-grown monolayer WS_2 on sapphire substrate. (d) - (f) show circularly polarized PL spectra as a function of temperature corresponding to (a) - (c), respectively. The excitation light is left-circularly polarized in all the measurements.

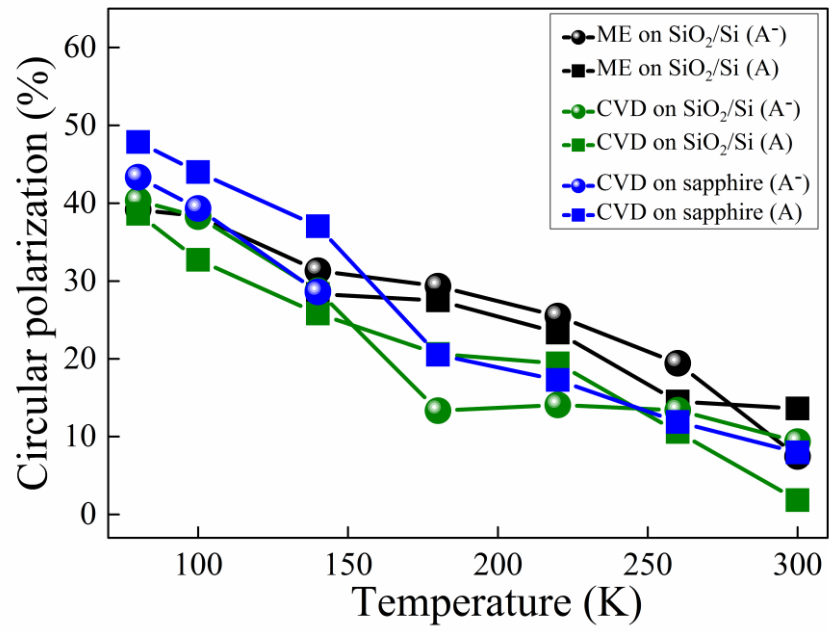


Fig. S2 Temperature dependence of circular polarization of A and A⁻ peaks for different types of monolayer WS₂ samples.

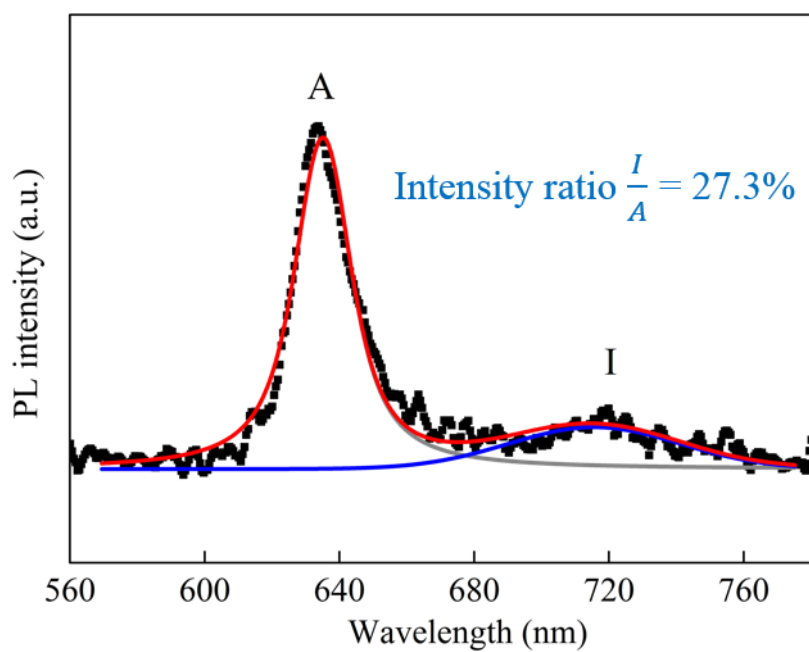


Fig. S3 PL spectrum of CVD-grown AA-stacked bilayer WS₂ on SiO₂/Si substrate at room temperature measured with integration time of 10 seconds. The intensity ratio of I and A peaks is 27.3%.

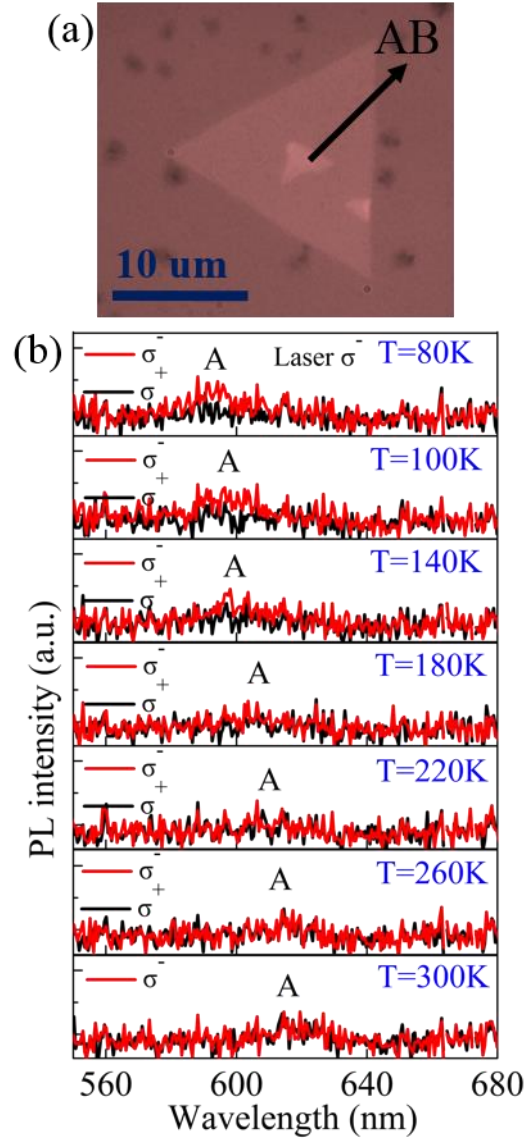


Fig. S4 (a) Optical image of CVD-grown AB-stacked bilayer WS_2 on sapphire substrate. (b) shows the corresponding circularly polarized PL spectra as a function of temperature. The excitation light is left-circularly polarized in all the measurements.

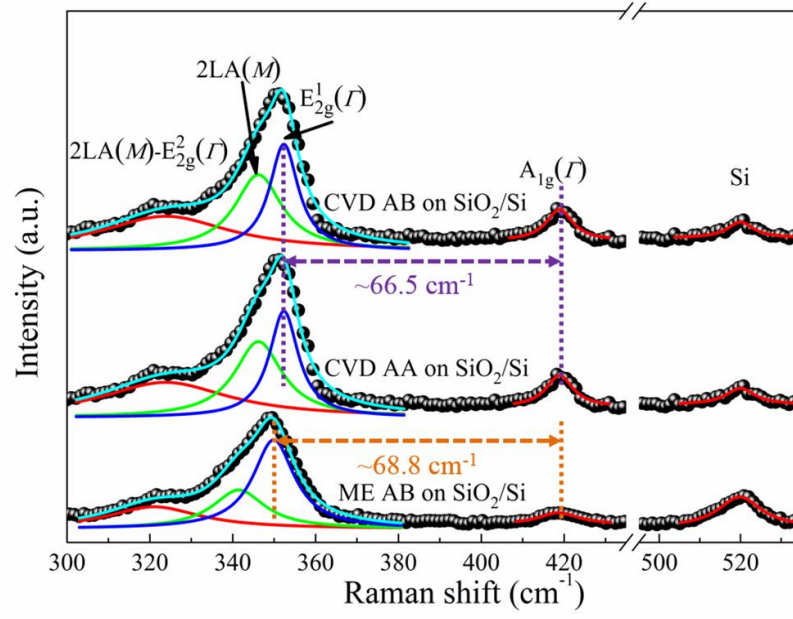


Fig. S5 Raman spectra of CVD-grown (both AA- and AB-stacked) and ME bilayer WS₂ on SiO₂/Si substrate with fitted curves. The dashed lines mark the frequency differences of E_{2g}¹(I) and A_{1g}(I) modes.