Electronic Supplementary Material (ESI) for Nanoscale Advances.

Supplementary Information for

Determination and investigation of defect domains in multi-shape monolayer tungsten disulfide

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Raman data recorded on WS_2

Raman spectra were recorded in the conditions described in the main text (Methods).

In Fig S1 we show spectroscopic images of the flakes in panels a, b and c. The intensity is given by the sum of the signal over the entire spectrum, at each pixel. In panels (d), (e) and (f), we show 25 spectra measured on the bright regions of each crystal, indicated by blue dots, forming a 5x5 square. In panels (g), (h), and (i), we show 25 spectra measured on the dark regions of each crystal, indicated by red dots, forming a 5x5 square. Superimposed to the single spectra, we display the average spectrum, plotted as a black dashed line.

For clarity, we display the average spectra for the bright and dark regions in Fig S2 a and b, respectively.

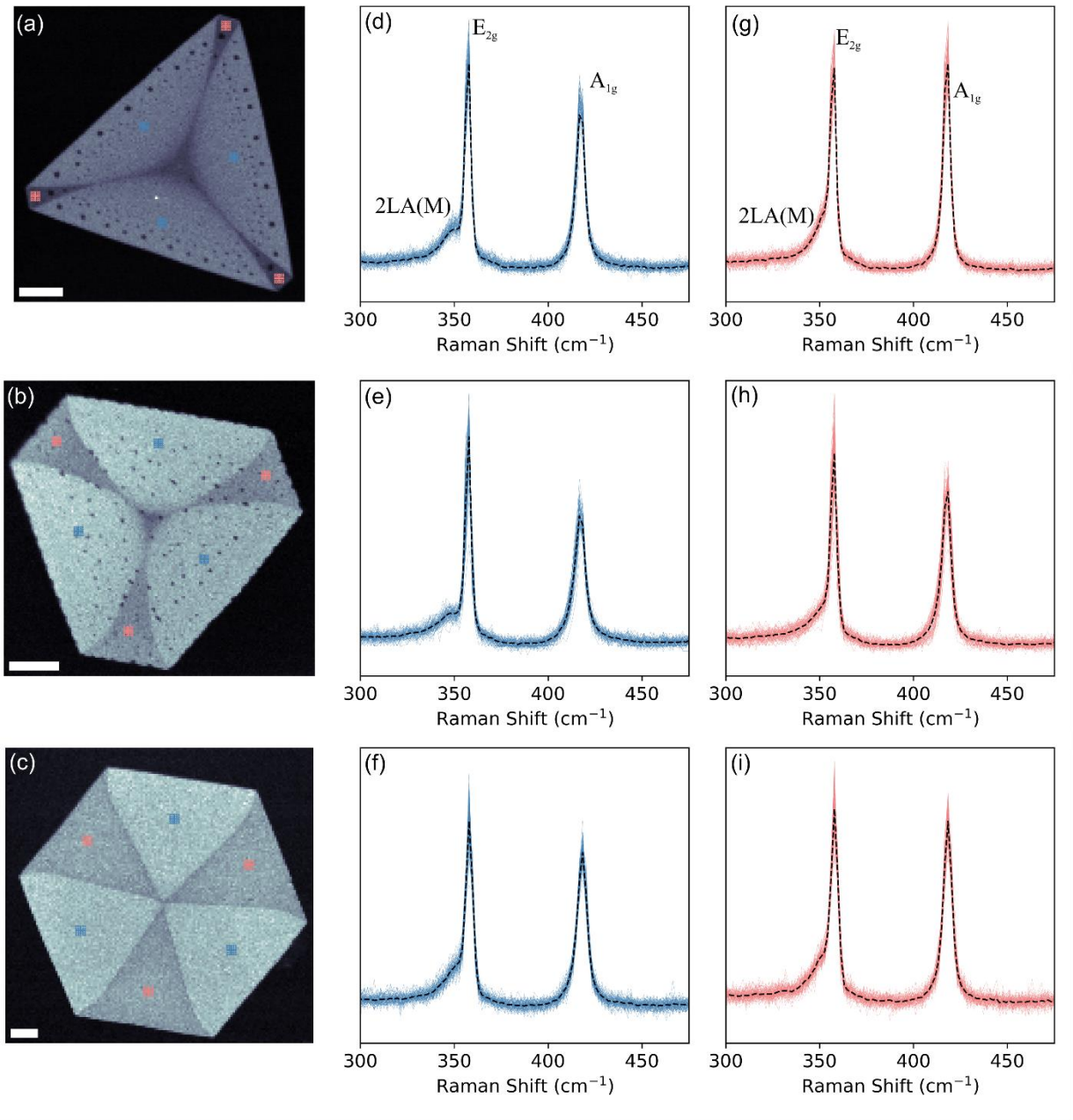

Fig. S1 (a, b, c) spectroscopic images of the flakes. The intensity is given by the sum of the signal over the entire spectrum, at each pixel. (d, e, f) 25 raw spectra measured on the bright regions, indicated by blue dots, indicated in panels a, b and c, respectively. (g, h, i), 25 raw spectra measured on the dark regions, indicated by red dots indicated in panels a, b and c, respectively. Superimposed to the single spectra, we display the average spectrum, plotted as a black dashed line. Intensities were normalized for the Si peak at 520 cm^{-1}.

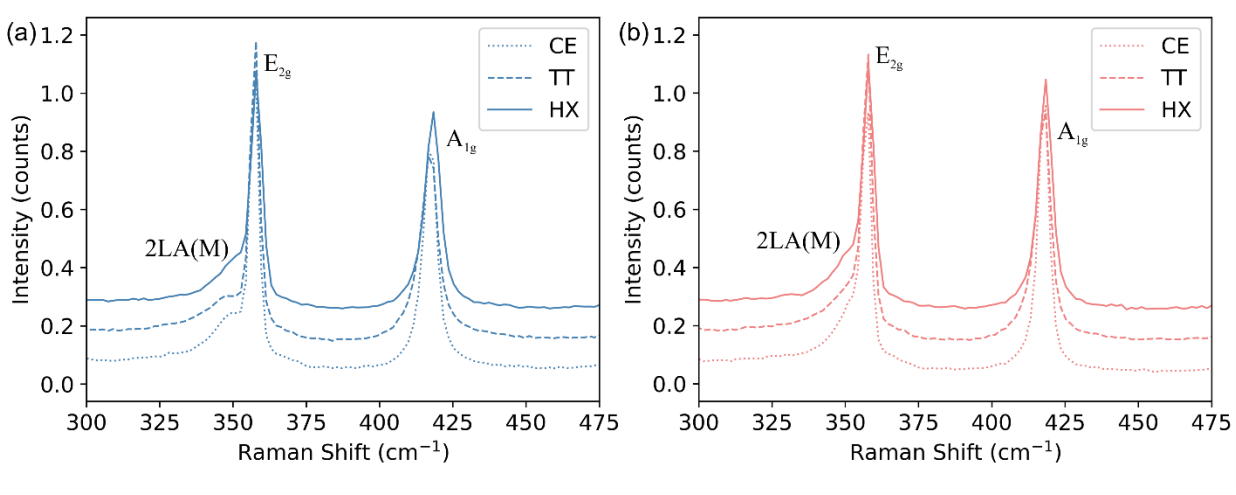

Fig. S2 (a) average Raman spectra (dashed line in Fig S1) for each crystal shape, recorded on the bright regions. (b) average Raman spectra (dashed line in Fig S1) for each crystal shape, recorded on the dark regions. Intensities were normalized for the Si peak at 520 cm^{-1} and each peak was then shifted along the y coordinate by 0.1.

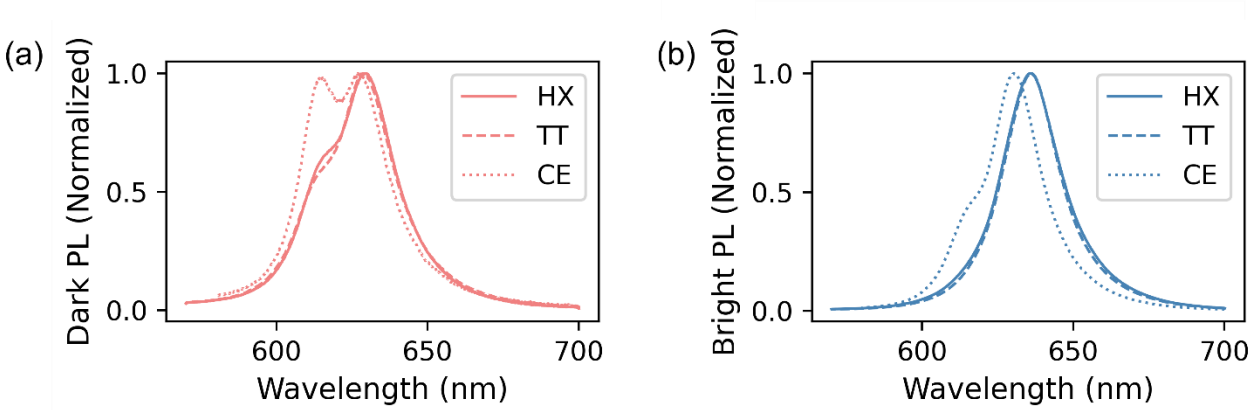

Fig. S 3: Photoluminescence spectra for dark (a) and bright (b) domains, as in Fig. 3 of the main text. The PL intensity has been normalized for better discern the trend of the spectra.

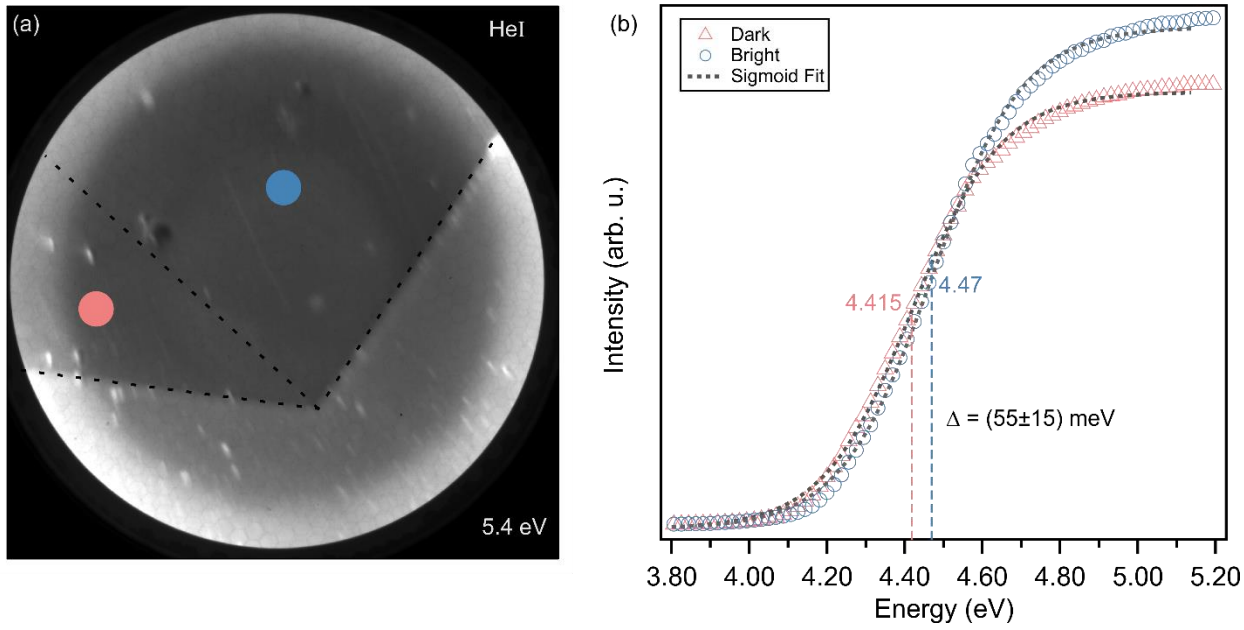

Fig. S4 (a) UVPEEM image of a hexagonal WS_2 flake. FOV= 91 µm. (b) UPS spectra recorded on the blue and red circles on panel (a). The difference highlighted is the difference in work function between the bright and dark domains.

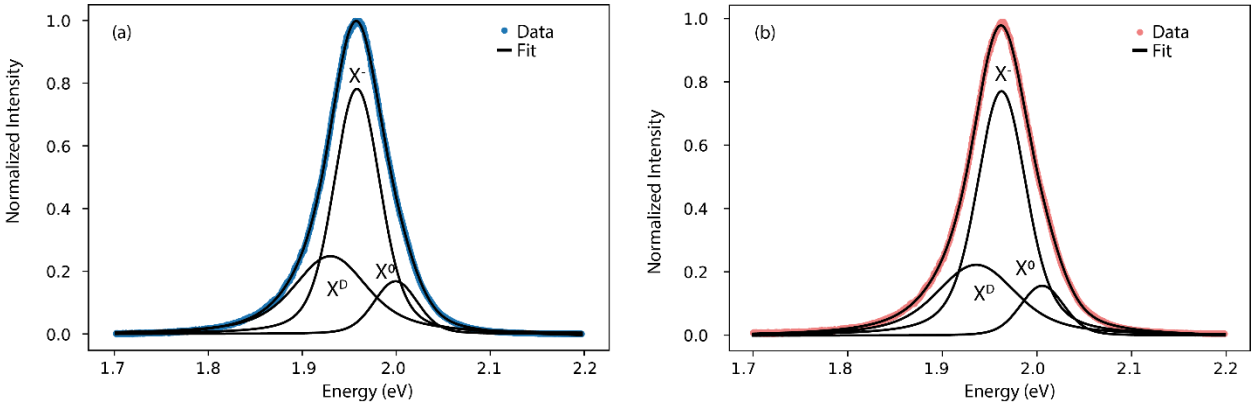

Fig. S5 Photoluminescence spectra at zero bias recorded on (a) bright and (b) dark domains. The PL spectra have been fitted with Voigt components, assigned to the neutral exciton X^0, the trion X^- and the defect bound X^D.