Supporting information

Radiative enhancement of single quantum emitters in WSe_2 monolayers using site-controlled metallic nano-pillars

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1. Position dependence of Purcell enhancement to an emitter

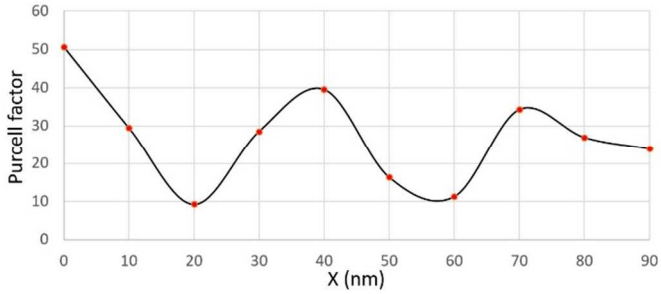

Figure S1. Purcell factor as a function of the x-position of an emitter at 780 nm

2. Photoluminescence spectrum of a bare WSe_2 monolayer area

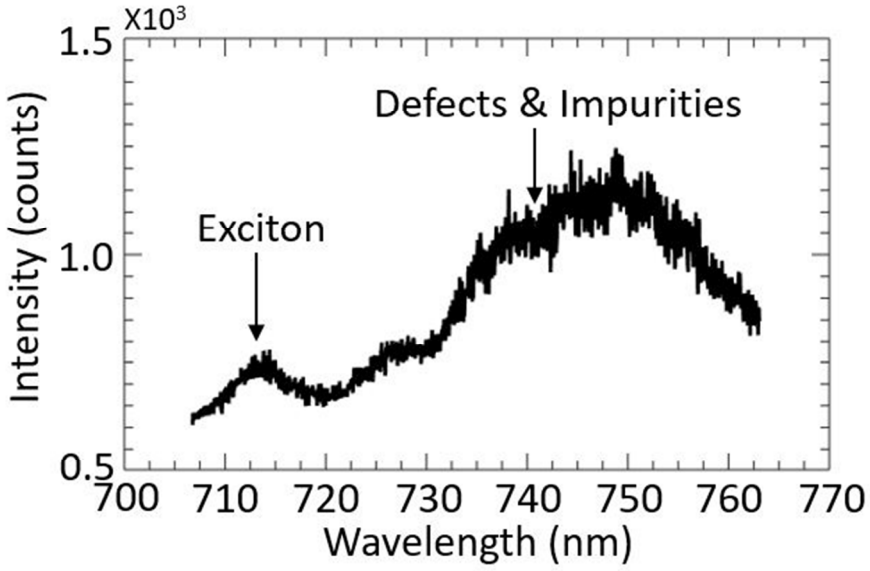

Figure S2. Photoluminescence spectrum of a bare WSe_2 monolayer area. Peaks correspond to the exciton and ensemble of defects and impurities.

3. Photoluminescence spectra of representative nano-pillar induced single defects

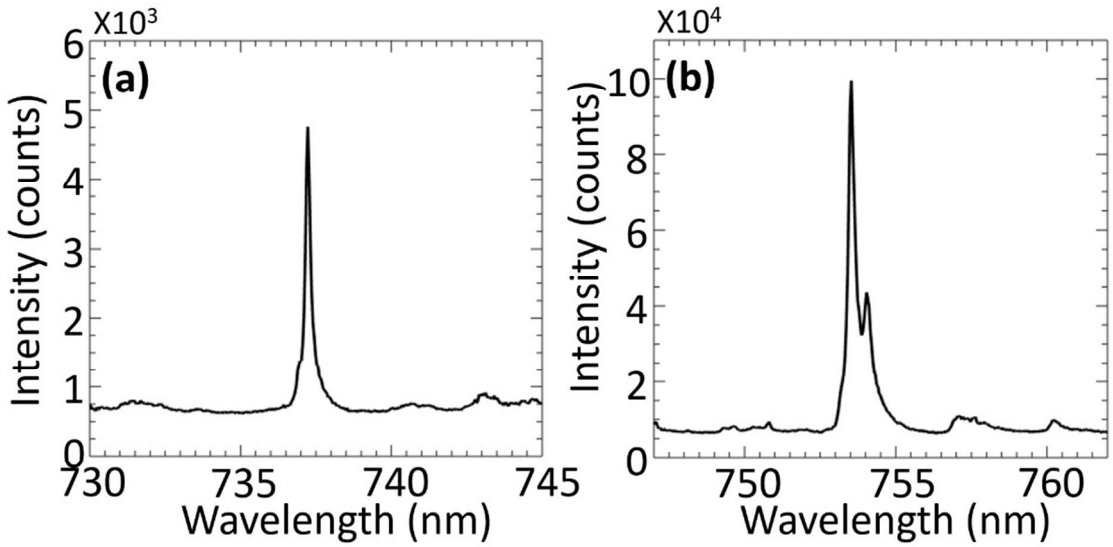

Figure S3. Photoluminescence spectra of representative nano-pillar induced single defects in WSe_2 monolayer exhibiting a (a) singlet. (b) doublet.

4. Photoluminescence spectra of representative nano-pillars exhibiting multiple peaks

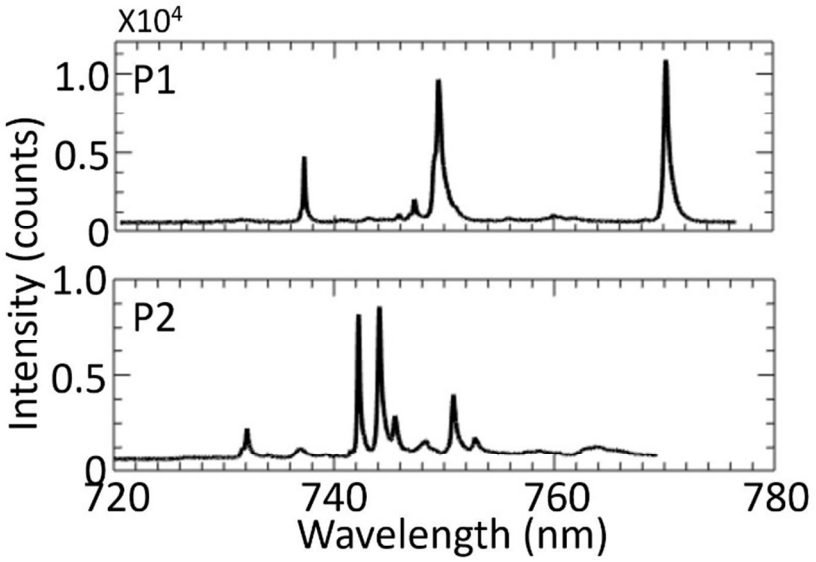

Figure S4. Photoluminescence spectra of two representative nano-pillars (P1 and P2). Each nano-pillar induces multiple emitters, corresponding to multiple peaks in the spectrum.

5. Lifetime versus photoluminescence intensity of naturally existing single defects in WSe_2 monolayers

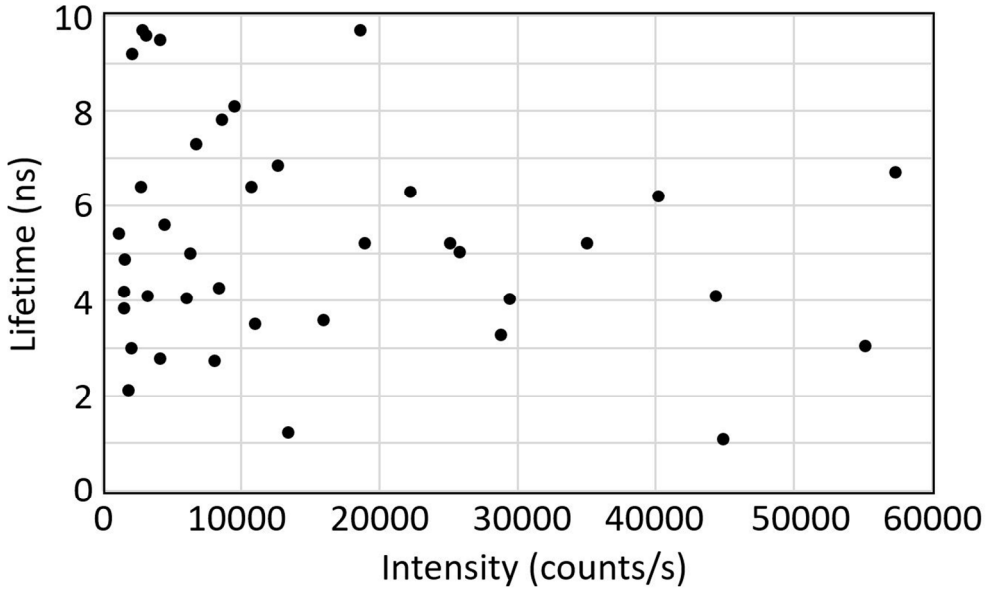

Figure S5. Lifetime versus photoluminescence intensity of natural single defects in WSe_2 monolayers. Each point corresponds to a single emitter.

6. Time-resolved photoluminescence measurements of single-defect emitters in WSe_2 monolayers

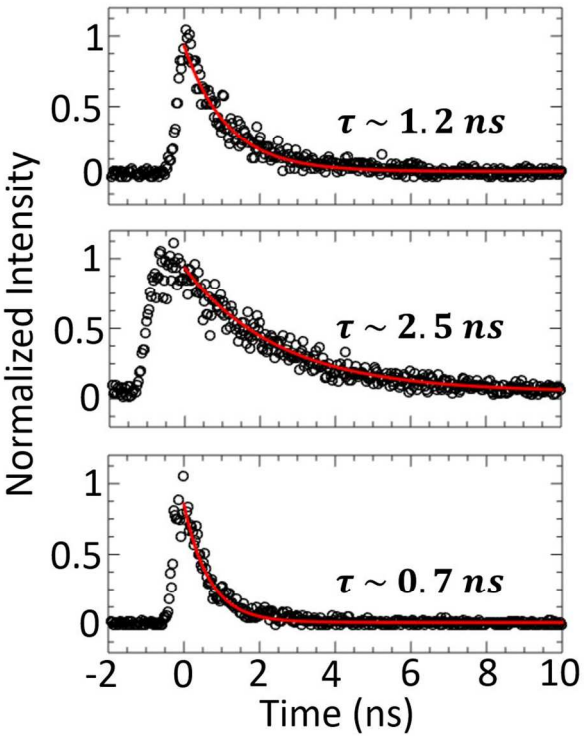

Figure S6. Time-resolved photoluminescence measurements of plasmonic nano-pillar induced emitters (black circles), fitted to a single exponential decay function (solid red curve)

7. Lifetime versus photoluminescence intensity of plasmonic nano-pillar induced emitters

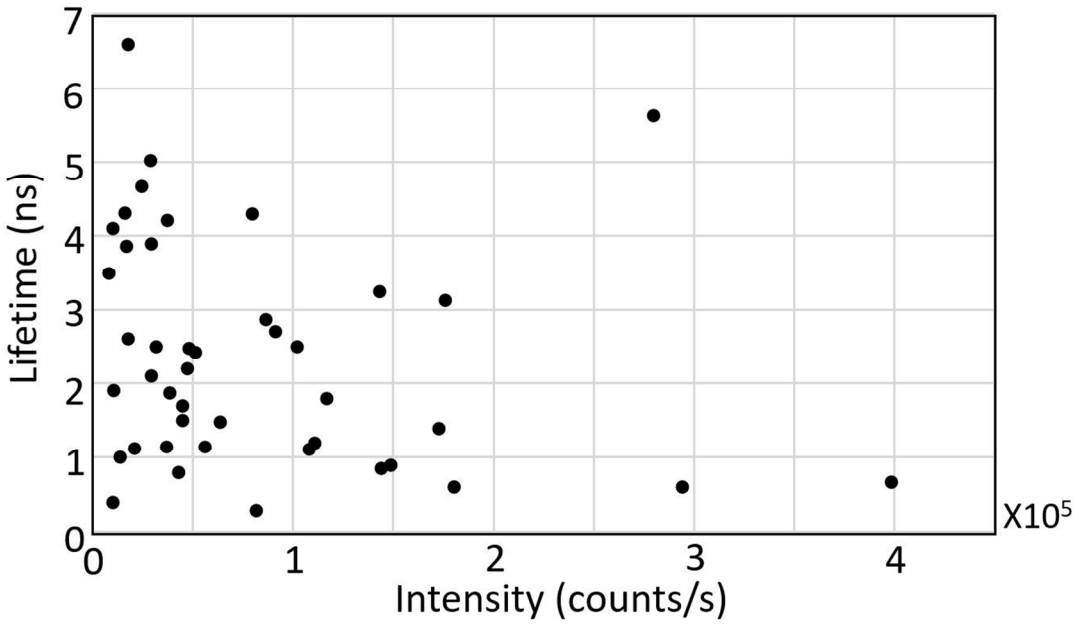

Figure S7. Lifetime versus photoluminescence intensity of plasmonic nano-pillar induced single defects in WSe_2 monolayers. Each point corresponds to a single emitter.

8. Lifetime versus wavelength of plasmonic nano-pillar induced emitters

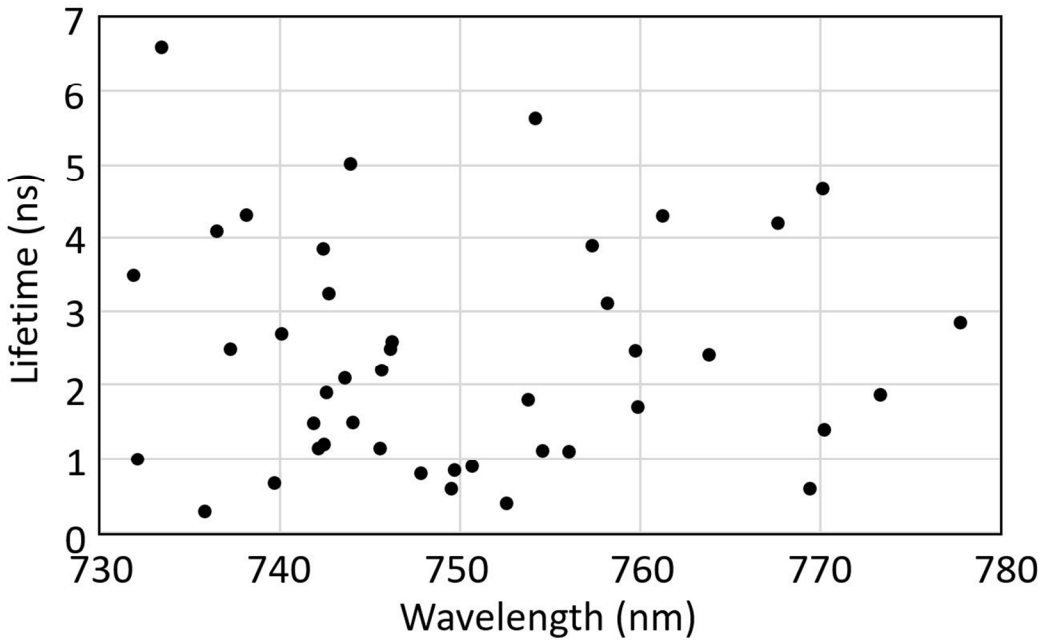

Figure S8. Lifetime versus wavelength of plasmonic nano-pillar induced single defects in WSe_2 monolayers. Each point corresponds to a single emitter.

9. Linewidth of single-defect emitters in WSe_2 monolayers

	Plasmonic nano-pillar induced emitters	Non-plasmonic nano-pillar induced emitters	Natural emitters
Linewidth (nm)	0.50±0.24	0.45±0.22	0.45±0.29

Table S1. Linewidth (FWHM) of single-defect emitters in WSe2 monolayers