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RESEARCH ARTICLE

Excited state biexcitons in monolayer WSe_2 driven by vertically grown graphene nanosheets with high-density electron trapping edges

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Supporting Information

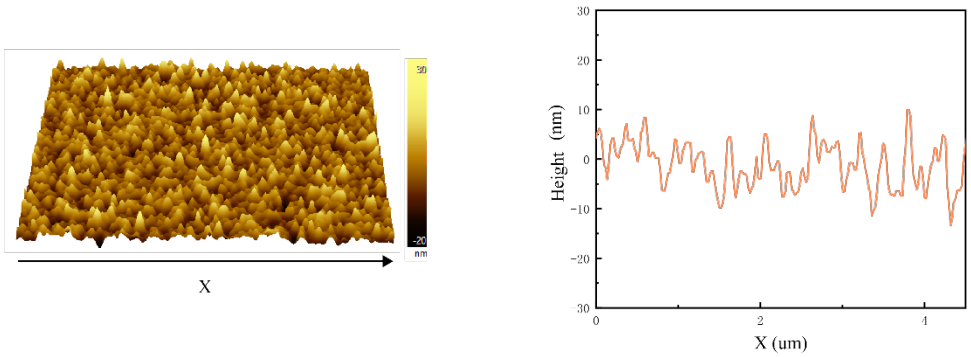
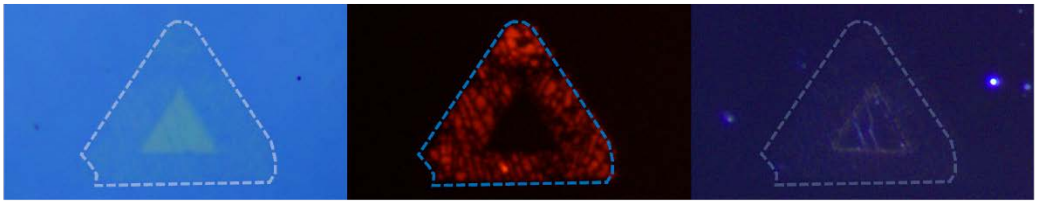


Fig. S1 AFM of carbon films surface (top). The right side is the surface height of the graphene nanosheet-embedded carbon (GNEC) film along the *X* direction.

(a)



Light field image Fluorescent image Dark field image

(b) (c)

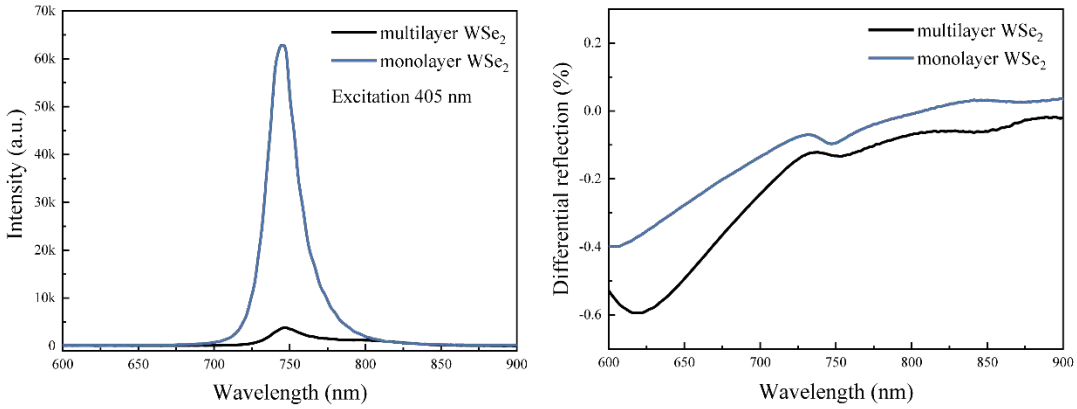


Fig. S2 (a) Photoluminescence (PL) states of WSe_2/TGNEC in different environments. **(b)** The PL of the TGNEC combined with multilayer WSe_2 and monolayer WSe_2 using a 405 nm laser. **(c)** The differential reflection of the TGNEC combined with multilayer WSe_2 and monolayer WSe_2.

Table S1 Excitonic binding energies of different temperature (meV).

Temperature (K)	T (trion)	X（biexciton）
298	23.88	-
208	31.95	40.22
163	35.86	46.31
118	31.82	49.2
77	32.36	45.15

Table S2 Excitonic binding energies of different excitation power (meV).

Excitation power (uW)	T (trion)	X（biexciton）
890	31.15	48.22
178	30.71	47.21
18	30.19	46.02
1.8	28.89	39.85

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