

Supplementary Information

Janus-Enhanced Magnetic Modulation under Strain and Carrier

Doping in Fe₃GaTe₂ Monolayer

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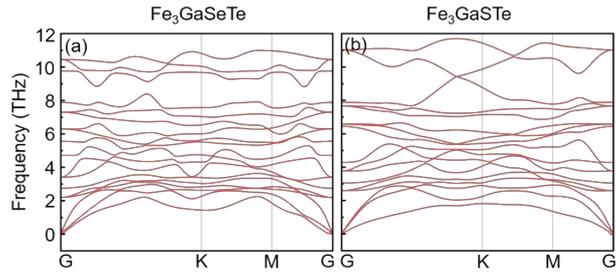


Fig S1. The phonon dispersions of monolayer (a) Fe₃GaSeTe and (b) Fe₃GaSTe.

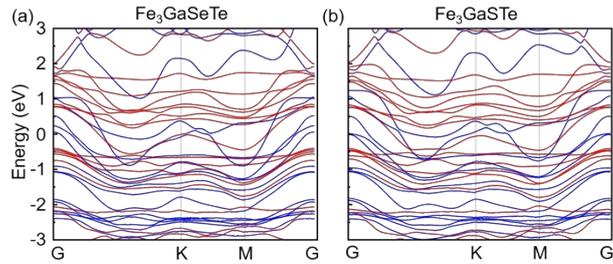


Fig S2. The band structures of monolayer (a) Fe₃GaSeTe and (b) Fe₃GaSTe.

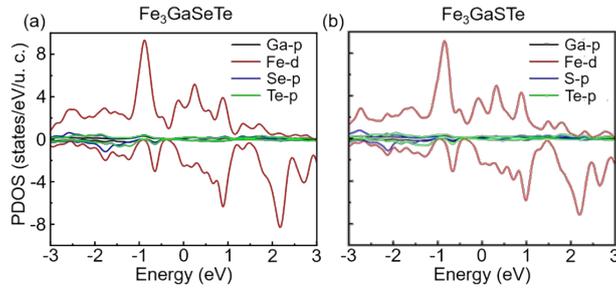


Fig S3. Atomic-projected density of states of monolayer (a) Fe₃GaSeTe and (b) Fe₃GaSTe.

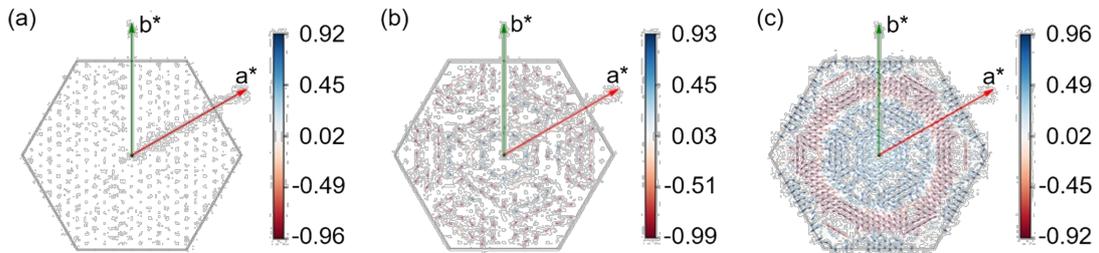


Fig S4. Spin texture of monolayer (a) Fe₃GaTe₂, (b) Fe₃GaSeTe, and (c) Fe₃GaSTe at the Fermi level, where the arrow colors denote the out-of-plane spin components and the arrow lengths denote the in-plane spin components.

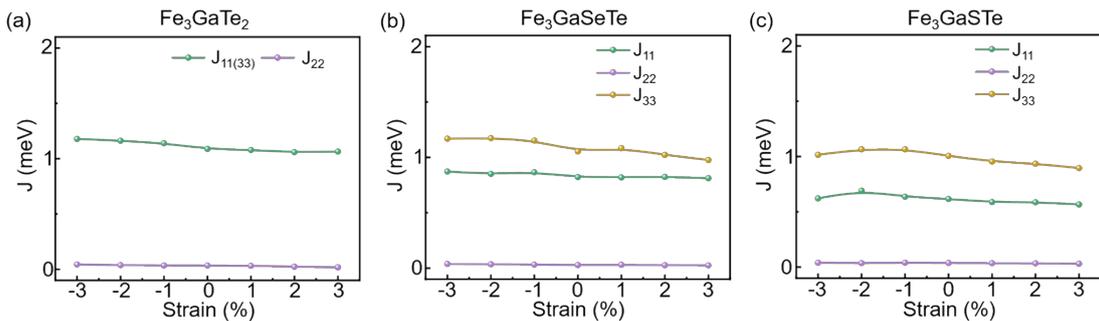


Fig S5. The strain-modulated intralayer exchange interaction energy of monolayer (a) Fe₃GaTe₂, (b) Fe₃GaSeTe, and (c) Fe₃GaSTe.

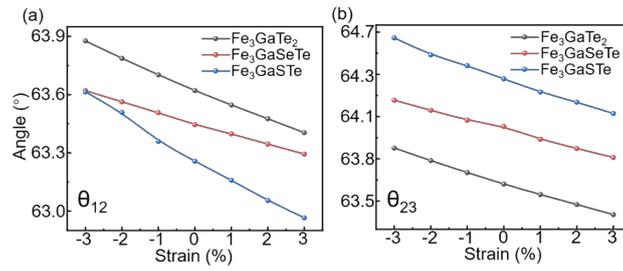


Fig S6. The strain-modulated bond angles of (a) Fe1-Ga-Fe2 and (b) Fe2-Ga-Fe3 super-exchange interaction pathway in the Fe₃GaXTe systems.

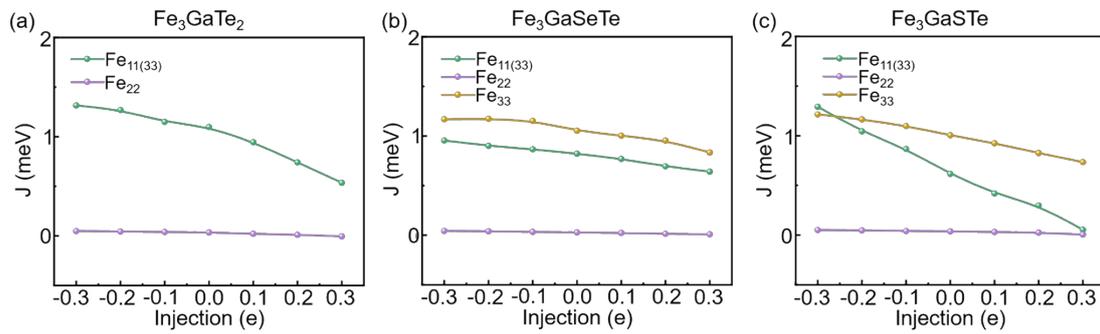


Fig S7. The modulation of intralayer exchange interaction energy of monolayer (a) Fe₃GaTe₂, (b) Fe₃GaSeTe, and (c) Fe₃GaSTe with various carrier injections.