Supplemental Material for

” Topological phase transitions driven by strains in monolayer tellurium”

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The SOC energy bands for structures with different strains in BS phase I are shown below.

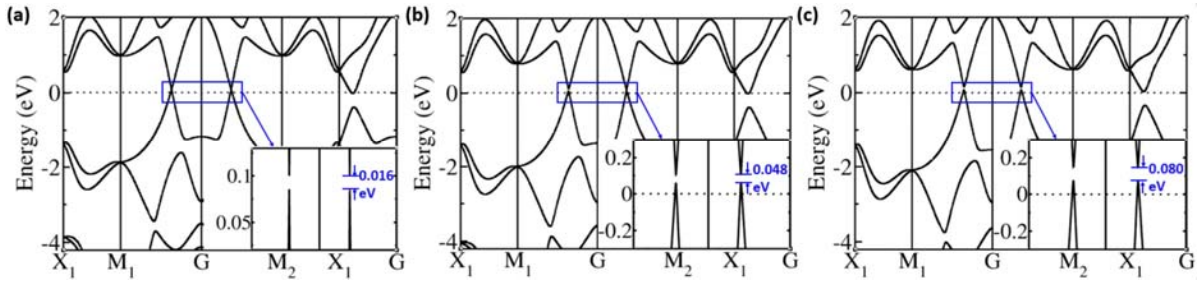

Fig. S1 Energy bands for structures with different strains in BS phase I, when considering SOC interaction. (a) When Δ = -5%, the band gap is 0.016 eV. (b) When Δ = -6%, the band gap is 0.048 eV. (c) When Δ = -7%, the band gap is 0.08 eV.

In equation (1), $H(k) = \mathrm{A}k_x + \mathrm{B}k_y + (ak_x + ck_y)\sigma_y + (bk_x + dk_y)\sigma_x + m\sigma_z$, m is the mass term which opens the band gap. Other parameters near the crossing points are listed below.

Table S1: Parameters used in equation (1) for BS structures with different strains and BS Te/$SrTiO_3$, respectively.

Strain	A (10^5 m/s)	B (10^5 m/s)	$\sqrt{a^2+b^2}$ (10^5 m/s)	$\sqrt{c^2+d^2}$ (10^5 m/s)
-4.5%	8.30	8.27	1.06	1.16
-5%	8.36	8.39	0.96	1.05
-6%	8.42	8.41	0.85	0.93
-7%	8.50	8.50	0.73	0.77
BS Te/$SrTiO_3$	7.98	7.96	0.99	1.03

To esimate the accuracy of the parameters, the parameters are fit to the first-principles energy bands of BS structures with various strains and BS Te/$SrTiO_3$. The red dots are parameter fitting bands, while black lines are energy bands from first-principles calculations.

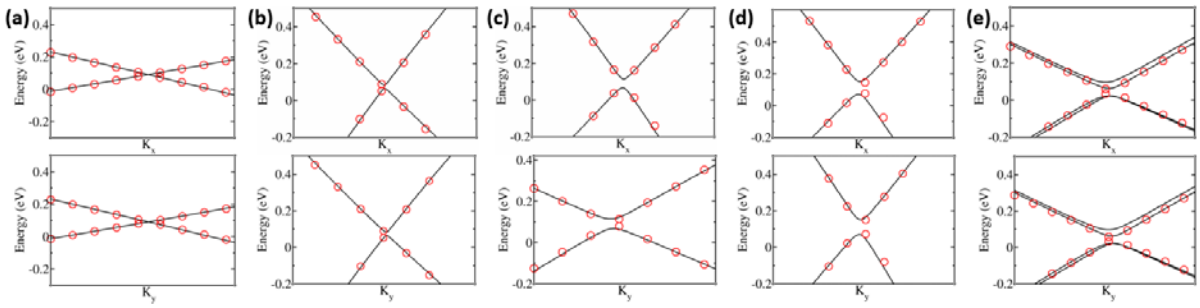

Fig. S2 (a) Δ = -4.5%, (b) Δ = -5%, (c) Δ = -6%, (d) Δ = -7%, (e) BS Te/$SrTiO_3$