Supplemental Information

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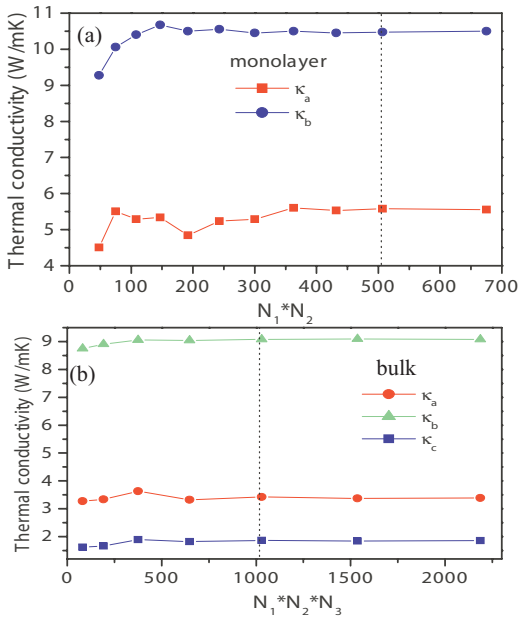

Figure S1: (Color online) Convergence tests for the thermal conductivities of both monolayer (a) and bulk (b) GaTe with increasing q-points in the phonon Brillouin zones. When increasing the q-points, we fixed $N_2/N_1 = 3$ and $N_3/N_1(N_2) = 3$ for the monolayer and bulk respectively. To accelerate the convergence, $\sigma = 1.0$ is employed in the calculations.

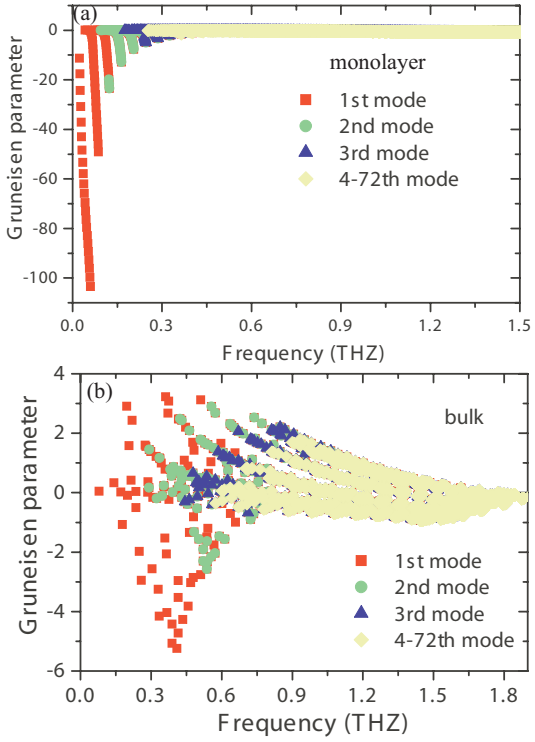

Figure S2: (Color online) Gruneisen parameter with respect to frequency for monolayer (a) and bulk (b) GaTe respectively. q-mesh of 50×150 and $15 \times 15 \times 45$ was used for monolayer and bulk GaTe respectively.

Table S1: Thermal conductivities (in unit of W/mK) and carrier mobilities (in unit of $cm^2V^{-1}s^{-1}$) at 300 K for typical two-dimensional materials. The superscripts h and e denote the hole and electron carriers respectively.

Composition	κ_a	κ_b	μ_a	μ_b
SnSe[1]	2.6	2.4	965.2^e	1035.8^e
BP[2,3]	10-20	20-40	$2600\text{-}6400^h$	$1300\text{-}4600^h$
Pd_2Se_3[4,5]	1.5	2.9	101.9^e	140.4^e
WTe_2[6,7,8]	9	20	$1500\text{-}5000^e$	
$PdSe_2$[9]	3.7	7.2	159.9^e	211.6^e
GeS[10]	7.8	10.5	529.6^h	1045.4^h
ReS_2[11,12]	50	70	338.8^e	799.6^e
GaTe[13]	5.5	10.4	21.3^h	6.2^h

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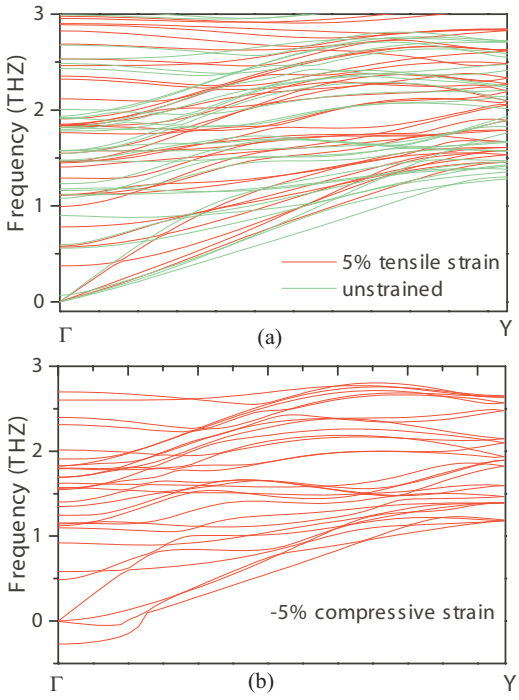

Figure S3: (Color online) Phonon dispersion along Γ-Y for the monolayer applied with $\pm 5\%$ biaxial strain. Note that the compressive strain leads to the negative phonon frequency, indicating the monolayer unstable.

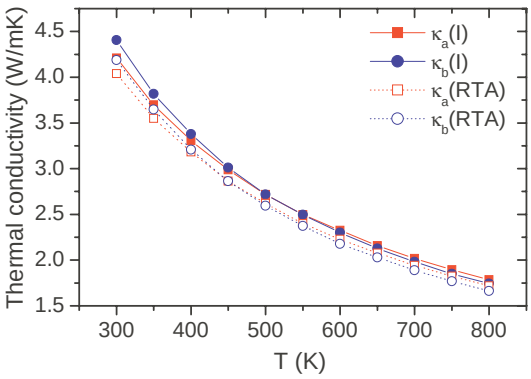

Figure S4: (Color online) Thermal conductivity versus temperature for monolayer GaTe with 5% biaxial tensile strain.

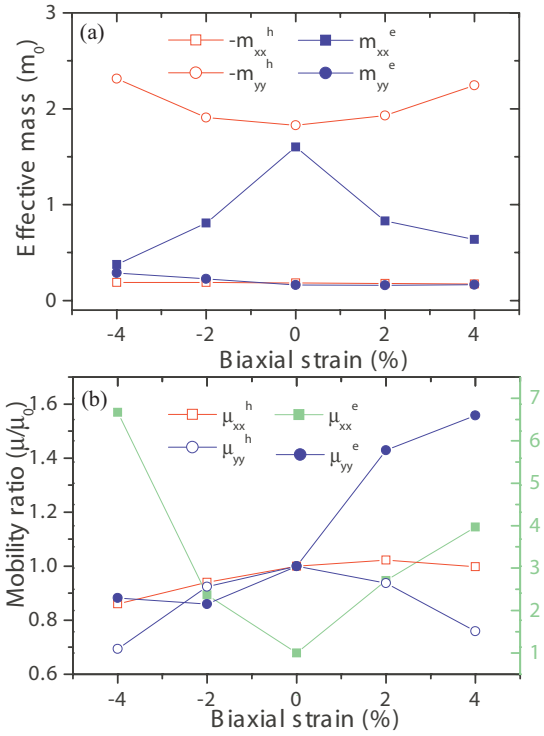

Figure S5: (Color online) Variations of effective mass (a) and charge mobilities (b) for monolayer GaTe when biaxial strain is applied to the layer.