Supplementary Information

Ultra-long Bismuth Telluride Nanoribbons Synthesis by Lithographically Patterned Galvanic Displacement

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Figure S1. The composition of Bi_xTe_y nanoribbons (A) and deposition rate (B) as a function of the trench depth. Squares and circles and represent 25 and 100 nm thick nickel layer respectively. The electrolyte consisted of 4 mM Bi^{3+} and 10 mM $HTeO^+$ in 1 M HNO_3 at room temperature.

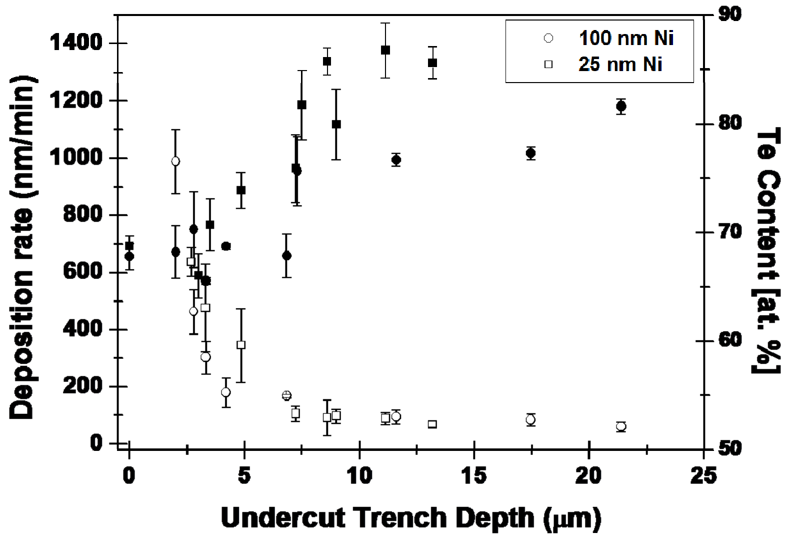


Figure S2. SEM images of FIB-milled specimens; Bi_xTe_y nanoribbons were protected from an ion beam by Pt deposition (a,b). The cross-sectional images of approx. 0.1 µm (c) and 0.025 µm (b) Bi_xTe_y nanoribbons. The thickness of 0.1 µm thick nanoribbon was more uniform (0.079 to 0.084 µm) compared to 0.025 µm thick nanoribbon (0.021 to 0.047 µm). Inset shows EDS analysis

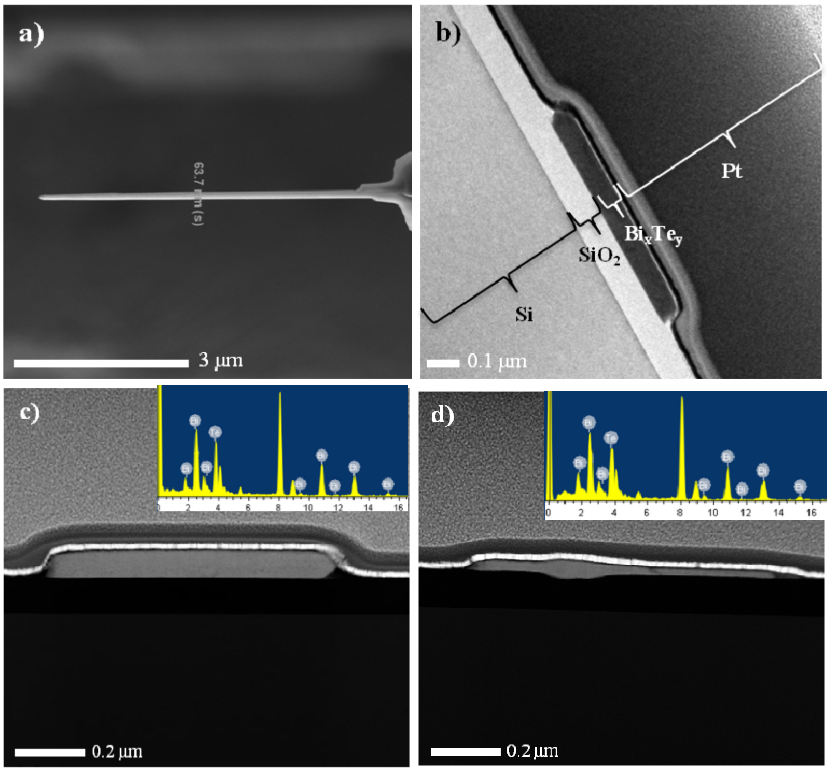


Figure S3. AFM images of nanoribbons with different compositions: 36 at. % Bi and 64 at. % Te (a), 18 at. % Bi and 82 at. % Te (b) nanoribbons.

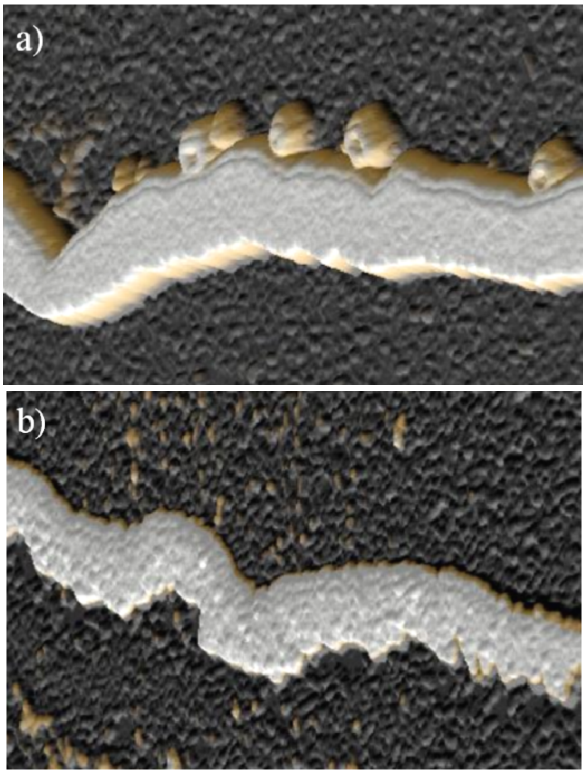
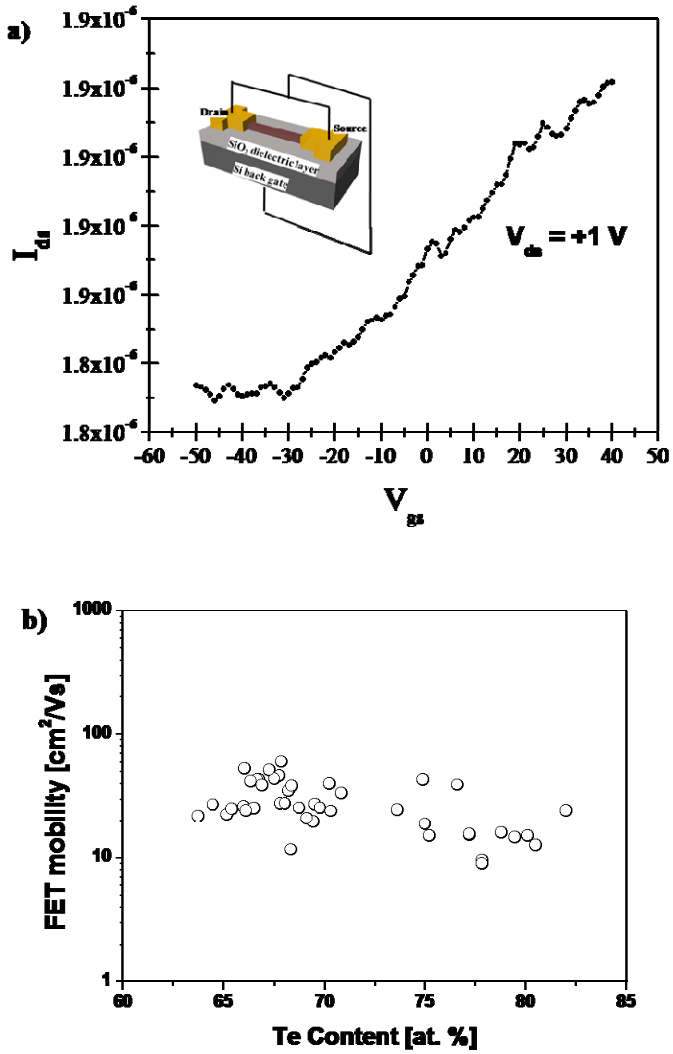


Figure S4. Back gated Bi_xTe_y nanoribbons FET with 0.3 μm thick SiO_2 as the dielectric layer: (a) a typical I_{ds} vs. V_{gs} characteristic at V_{ds} = +1 V and (b) FET mobility as a function of Te content at room temperature.



Supplementary Material (ESI) for Journal of Materials Chemistry

Figure S5. Temperature dependence of the resistivity of the annealed Bi_xTe_y nanoribbons. The nanoribbons were annealed at 200 °C in 5% H_2 (g) /N_2 (g) for zero, 2 and 8 hour.