**DSC analysis**

A typical DSC trace recorded at a heating rate of 10°C/min. is shown in Fig. S1. It is known that, while the sample is crystallizing with a heat-flux DSC measurement, positive deviations in heating rate occurs as the heat evolved causes the measured temperature to exceed the programmed one. This thermal inertia phenomenon, depending on the heat capacity of the sample, can cause a distortion of the kinetic process. The weight of sample was kept below 10 mg, as a low-mass sample can quickly reach temperature equilibrium throughout its volume. In the DSC analysis of gallium telluride crystals, the heat flow difference between the sample and reference was measured in the temperature range 50-450°C, with a scanning rate of 10°C/min. Peak showing the glass transition is absent and in the measured range, the formation of multiphase is also not observed, which rules out the presence of polymorphism in GaTe crystals.

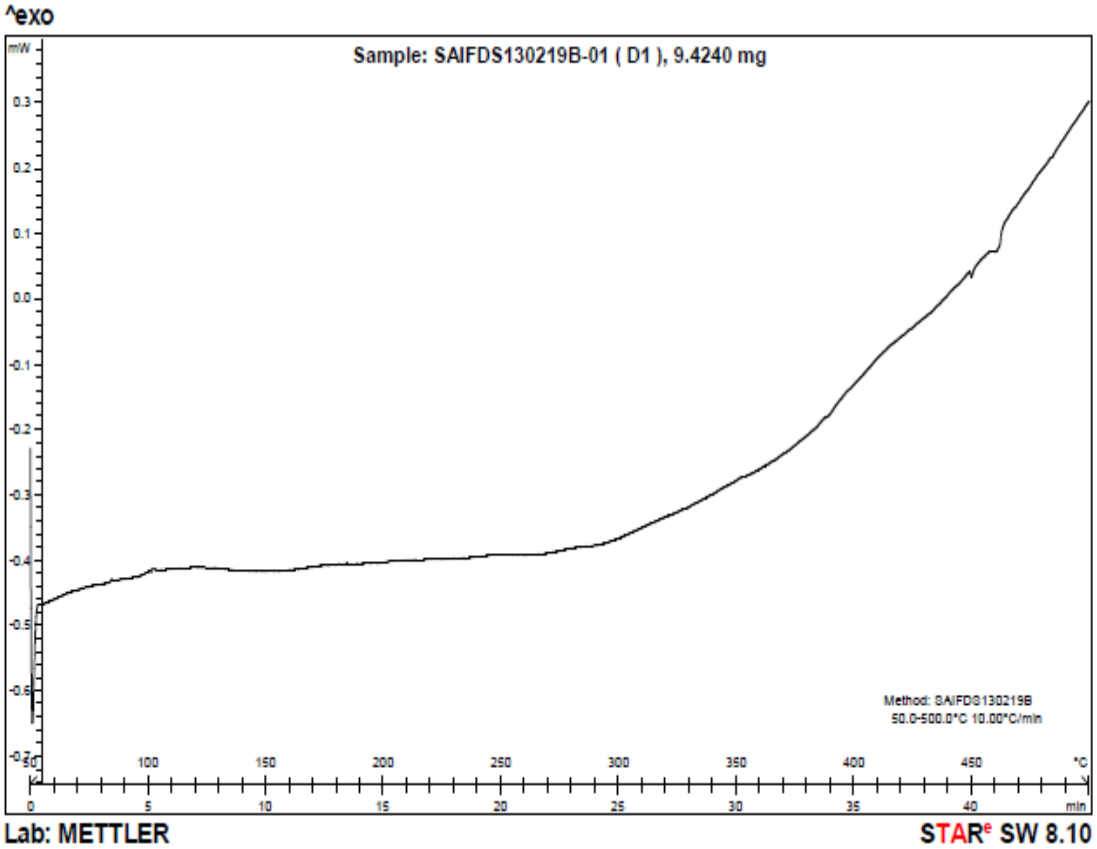


**Fig. S1.** DSC trace of GaTe sample.

**Supplementary figures**

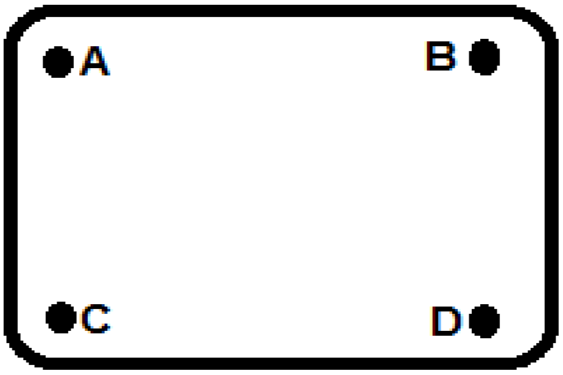


**Fig. S2.** Schematic of four ohmic contacts on the crystal surface.

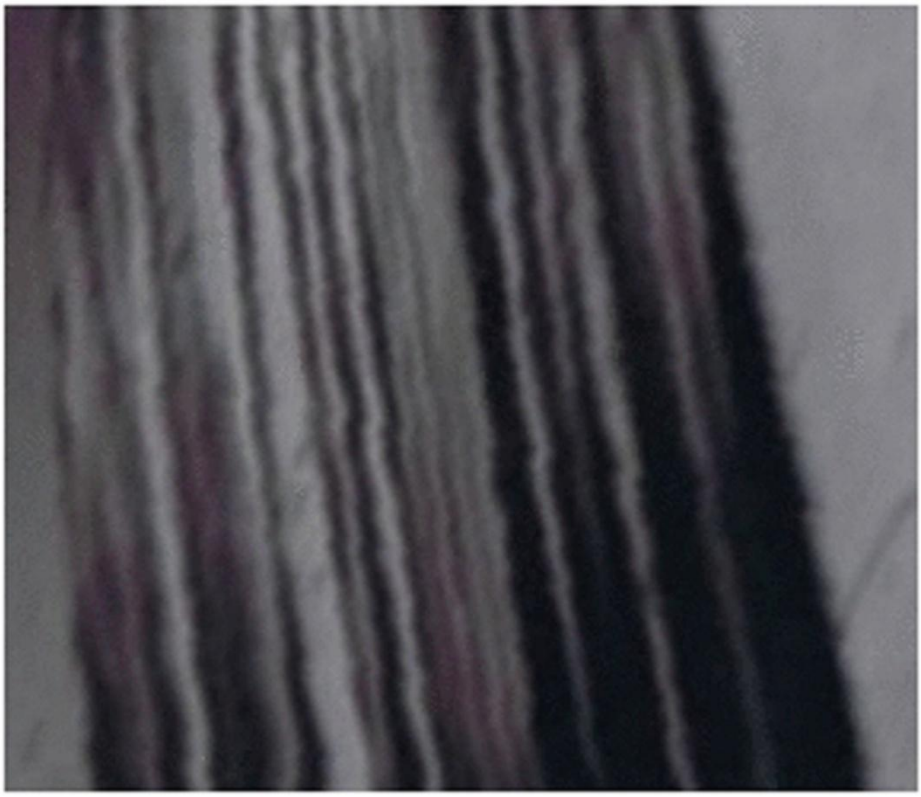

**Fig. S3.** Periodic arrangement of layers on an as-grown surface (1600x).

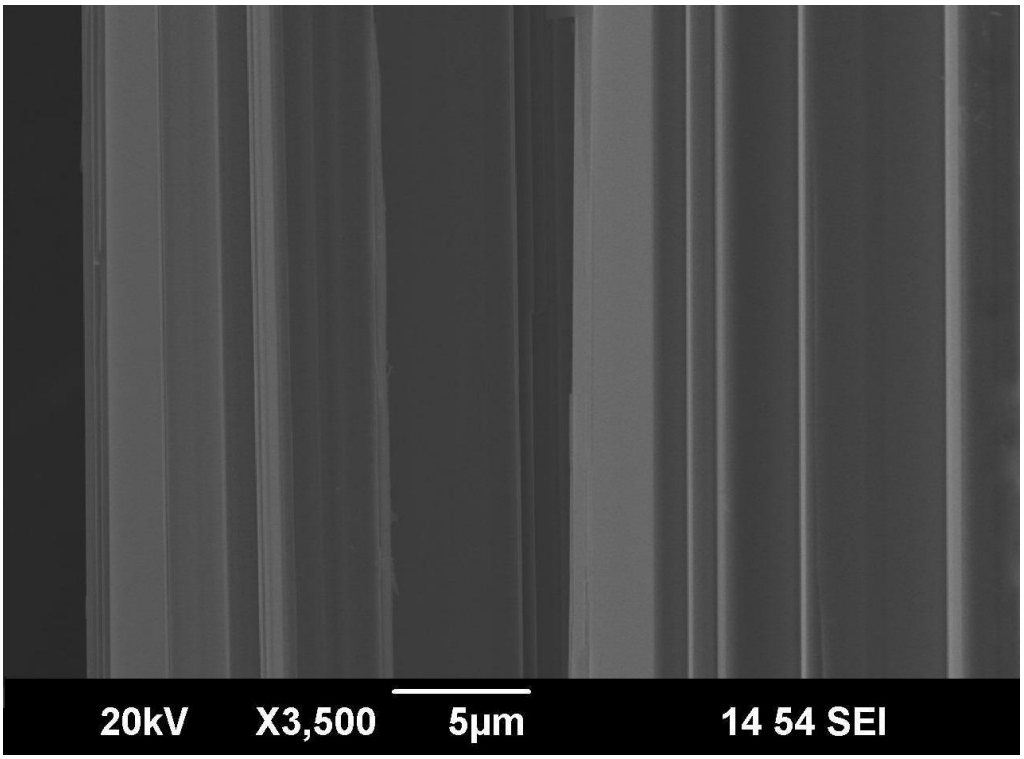


**Fig. S4.** SEM image of the formation of steps and ledges on the cleaved surface.

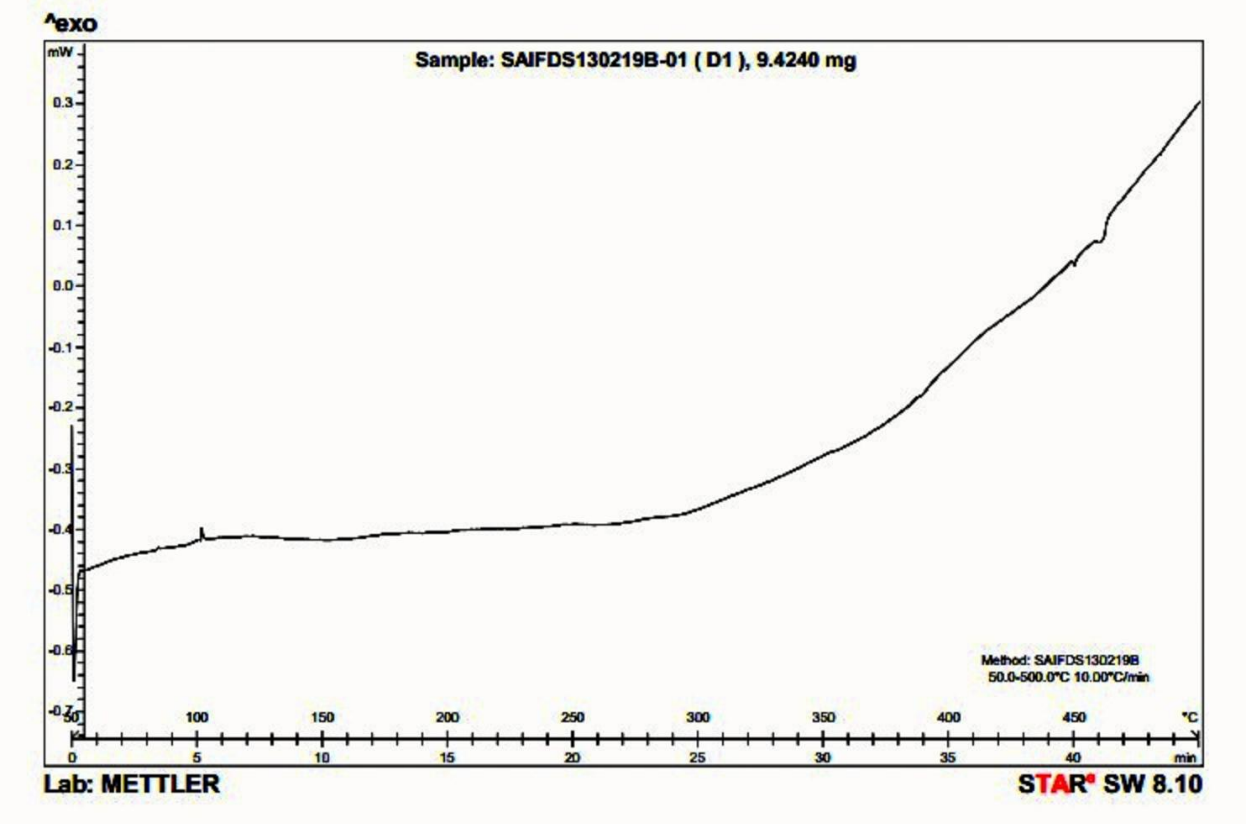


**Fig. S5.** DSC trace of GaTe sample.