

Figure S1 The angle of view in SEM images.

The cross section of GST thin film was prepared via mechanical cleavage. The surface of sample was covered with a thin layer of carbon. Many different angles are applied to characterize the morphology of the thin film, as shown in Figure S1.

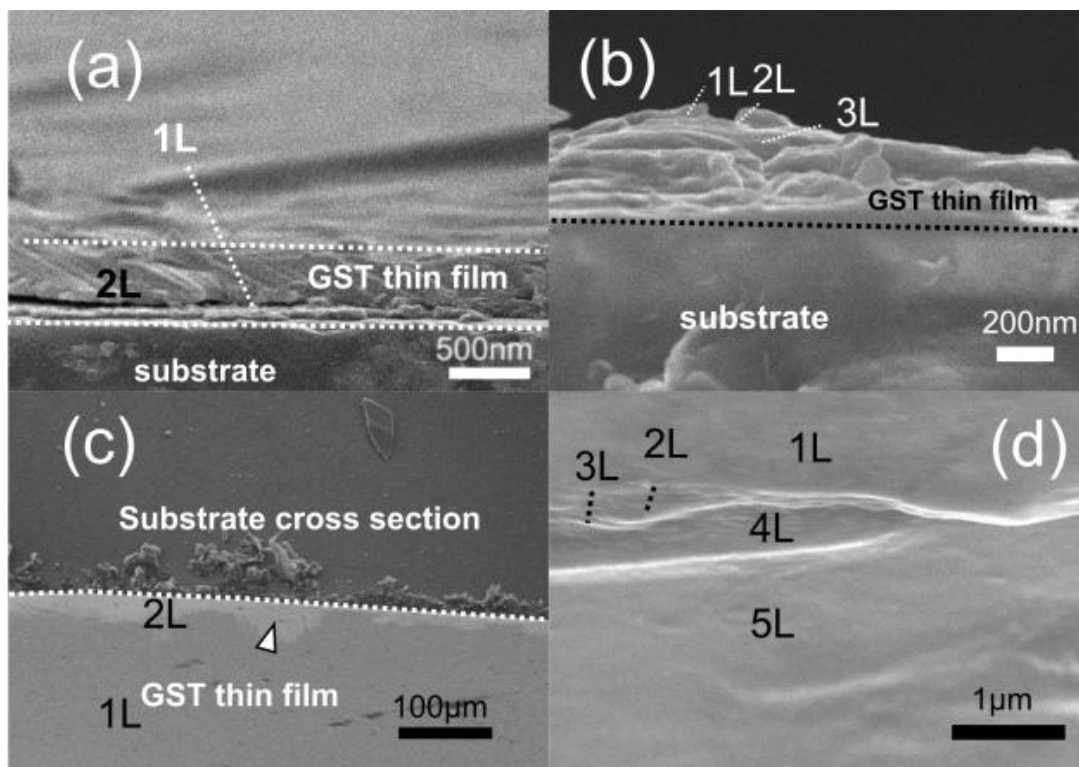


Figure S2 (a)-(d) The SEM image of crystalline GST thin film in the cross sectional view (with different angles).

After crystallization, we can see the GST thin film was exfoliated into 2 monolayers in Figure S2 (a) (angle 5 in Figure S1). In some other cases, more monolayers can be seen (angle 1 in Figure S1) as shown in Figure S2 (b). In the low magnification of sectional view (angle 2 in Figure S1), thin film and glass substrate are shown Figure S2 (c). During cleavage, some monolayers are peeled off. We can see two layers (1L, 2L) in Figure S2 (c). In the enlarged view of Figure S2 (c) (the place of white arrow), at least 5 monolayers are present (angle 4 in Figure S1) in Figure 2(d).

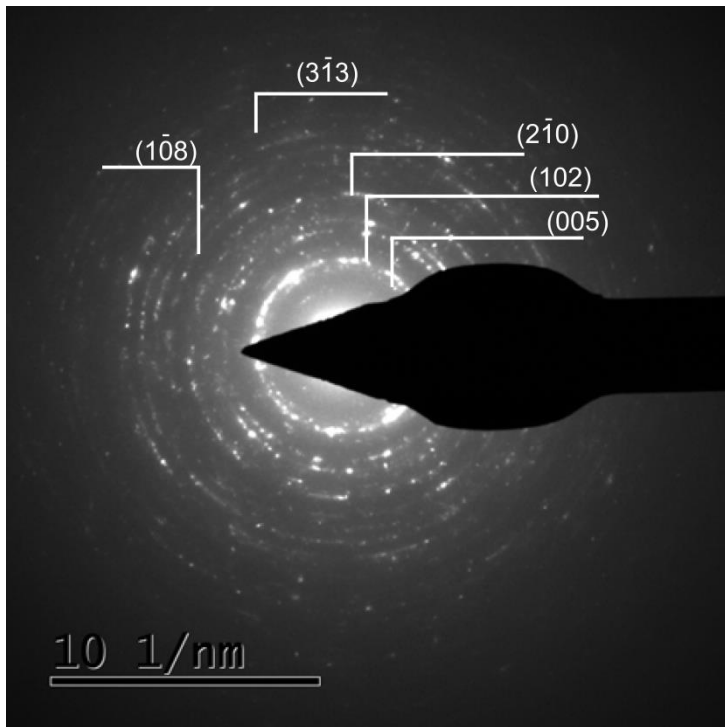


Figure S3 The SAED (Selected area diffraction) patterns of GST crystalline thin film.

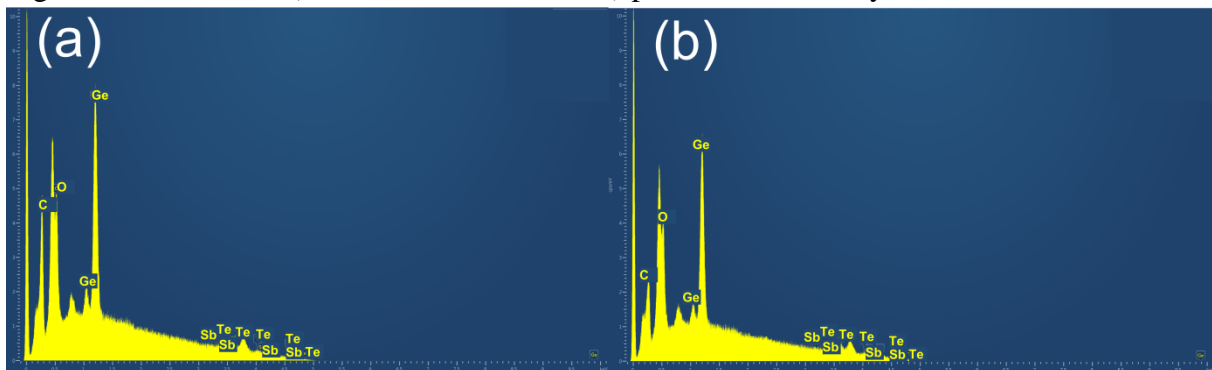


Figure S4 The EDX spectra of (a) amorphous and (b) crystalline GST.

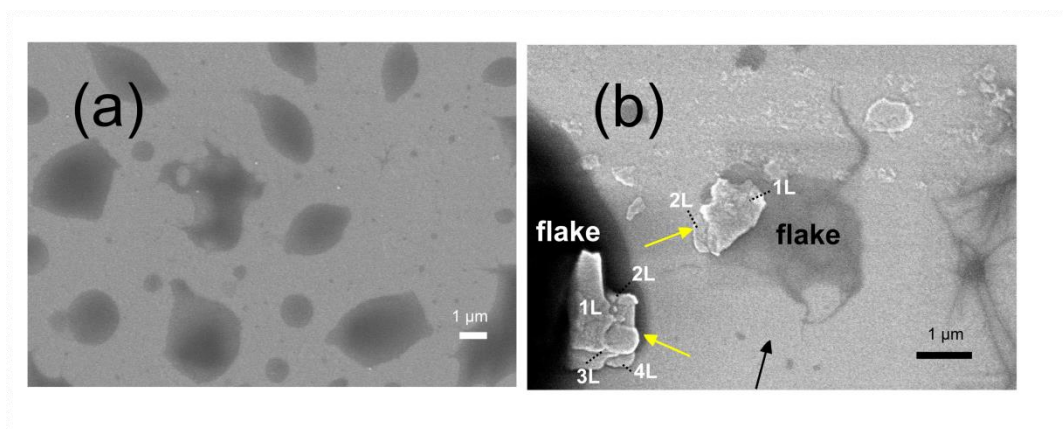


Figure S5 (a) The SEM image of amorphous GST flakes. (b) The SEM image of crystalline GST flakes.

Figure S4 shows the SEM image of GST flakes. The black areas in Figure S4 are the amorphous flakes. In Figure S4 (b), more monolayers are found with the crystalline flakes.

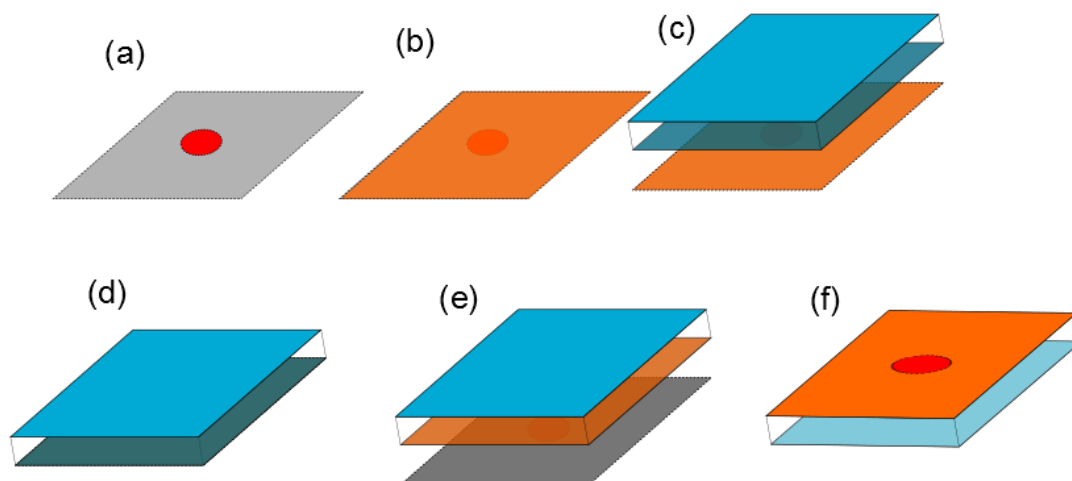


Figure S6 (a) The flakes are deposited onto glass substrate. (b) After drying, another layer of Au (50 nm) is evaporated onto the substrate. (c) The second glass substrate is glued to the sample via melted wax. (d) Two pieces of glass are glued together. (e) The separation of two glass pieces. (f) The upper side of glass is measured via conductive AFM.

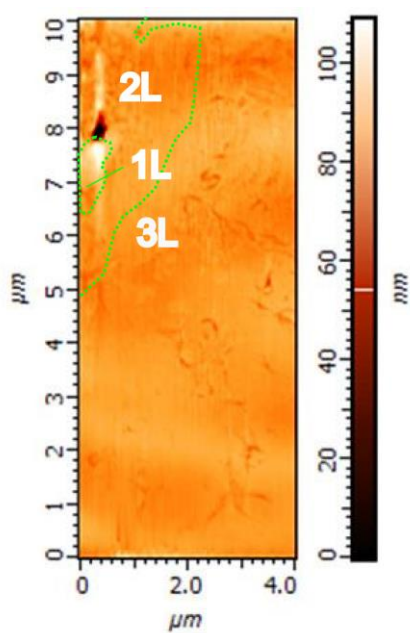


Figure S7 The topography of GST crystalline flake, measured by conductive AFM.