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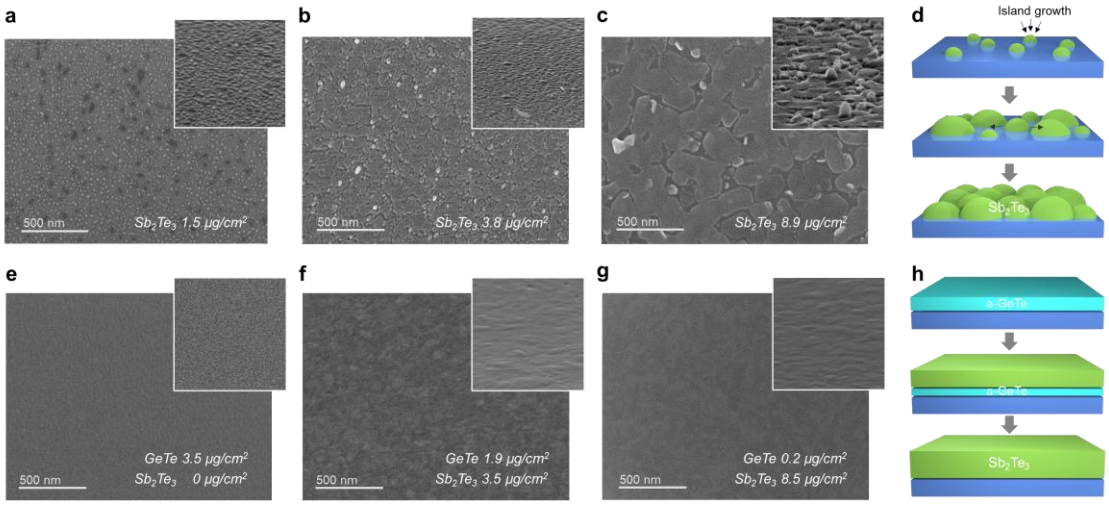

Figure 1. Top-view SEM images and illustrations of Sb_2Te_3 films deposited on SiO_2 substrates (a-d) without and (e-h) with the a-GeTe buffer layer. The images show the films deposited without the buffer layer after (a) 200, (b) 500, and (c) 1200 cycles of Sb_2Te_3 ALD, and with the buffer layer after (e) 80 cycles of GeTe ALD, followed by (f) 100, and (g) 400 cycles of Sb_2Te_3 ALD. The inset images are bird's eye-view SEM images taken at a 70° tilt from the surface normal direction, and the layer density of each layer is indicated in the bottom right corner of each image.

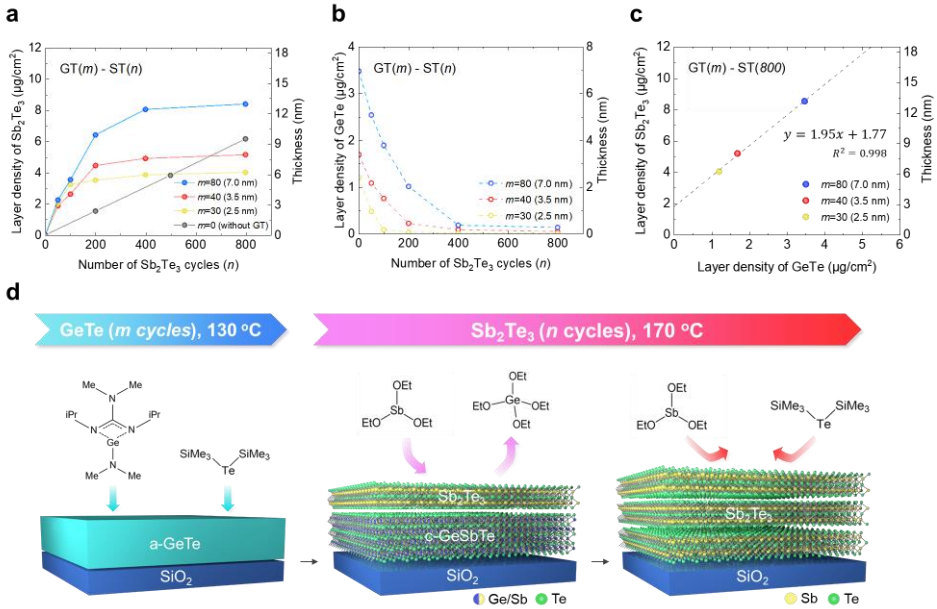

Figure 2. (a) Variation of layer density (left y-axis) and thickness (right y-axis) of the Sb_2Te_3 film as a function of the number of ALD cycles, with different thicknesses of the a-GeTe buffer layer (0, 2.5, 3.5, and 7.0 nm-thick). (b) Variation of layer density (left y-axis) and thickness (right y-axis) of the a-GeTe buffer layer as a function of the number of Sb_2Te_3 cycles. (b) Linear correlation between the saturated layer density (left y-axis) and thickness (right y-axis) of the Sb_2Te_3 layer as a function of the a-GeTe layer density. (d) Process flow for ALD of Sb_2Te_3 film utilizing an amorphous GeTe film as a buffer layer. Chemical formulas on the surface indicate the Ge, Sb, and Te-precursors.

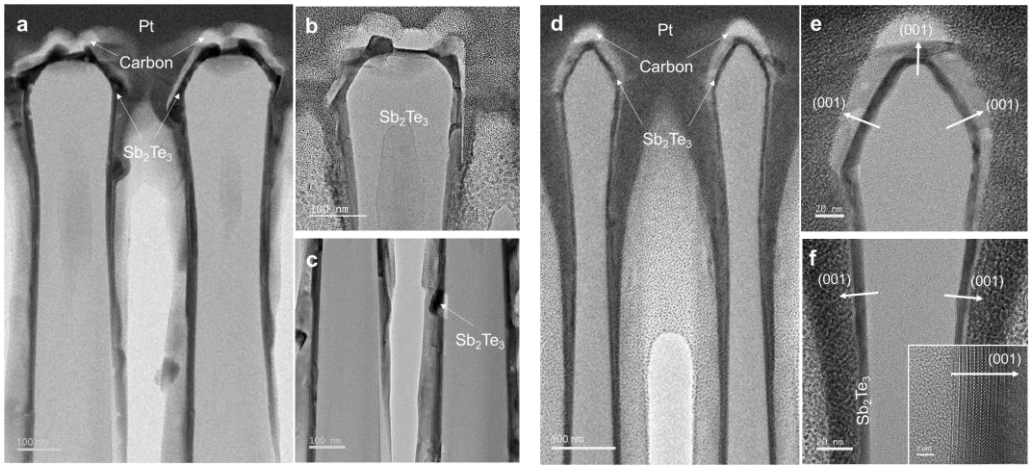

Figure 3. Cross-sectional TEM images of a Sb_2Te_3 film on a three-dimensional contact hole structure (a-c) without, and (d-f) with an a-GeTe buffer layer.