

Supporting information for

The Environmental Stability of Large-size and Single-crystalline Antimony Flakes Grown by Chemical Vapor Deposition on SiO₂ Substrates

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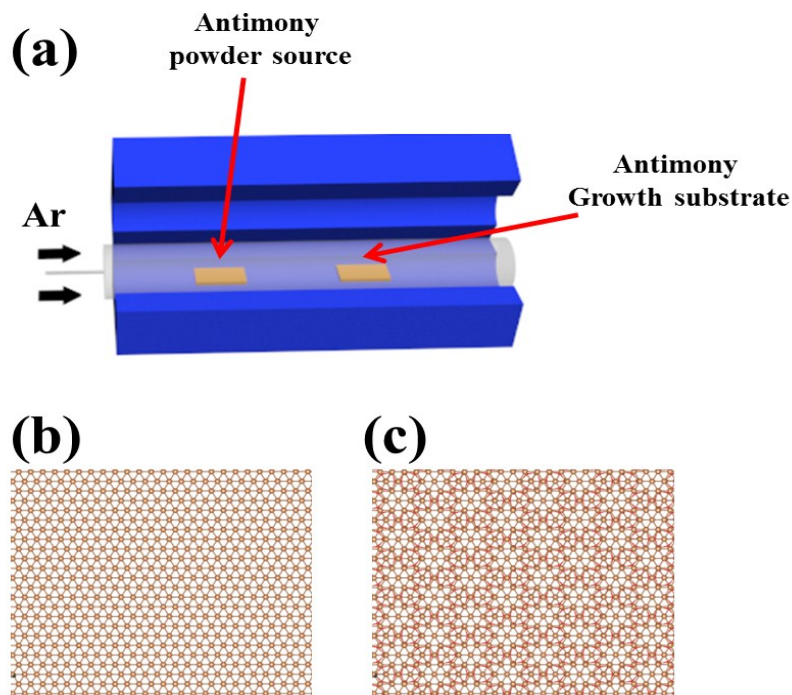
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Growth process: To grow the antimony flake on a SiO₂ substrate, the SiO₂ substrate was cleaned by acetone, IPA, and DI water using sonication for 5 min, separately. Then, dry nitrogen gas was used to dry the substrate surface. After cleaning, the sample was then loaded into the CVD growth chamber for growth. An Sb (Alfa Aesar, # 14640) powder source was used to grow the antimony flake. The powder was placed 10 cm upstream from the substrate. Ar gas (100 sccm) was used as the carrier gas. At a growth temperature of 600 °C, the growth time was 10 min. After growth, a fan was used to lower the temperature within 10 min to room temperature.

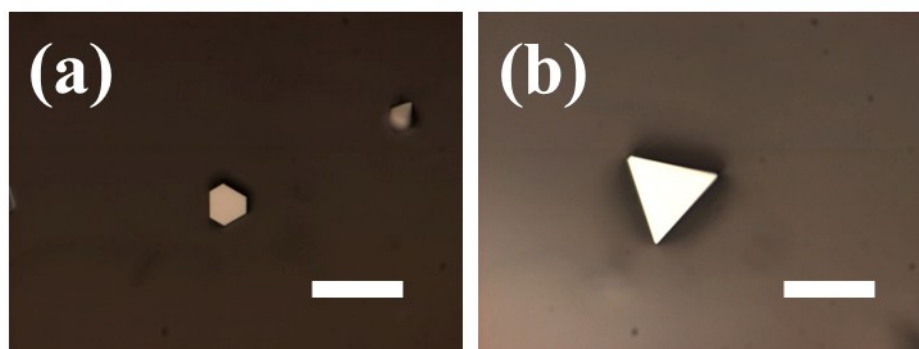
Oxidization: (a) Oxidization in air at room temperature: we placed the sample in the hood at a humidity of ~ 32%, and measured the Raman spectra daily. (b) Oxidization on a hot plate: we placed the same sample on a hot plate at different temperatures (50 °C, 100 °C, 150 °C...400 °C) for 1 min. After each oxidation step, we measured the Raman spectra or Raman map.

Characterizations: To characterize the environmental stability of the antimony flake, we

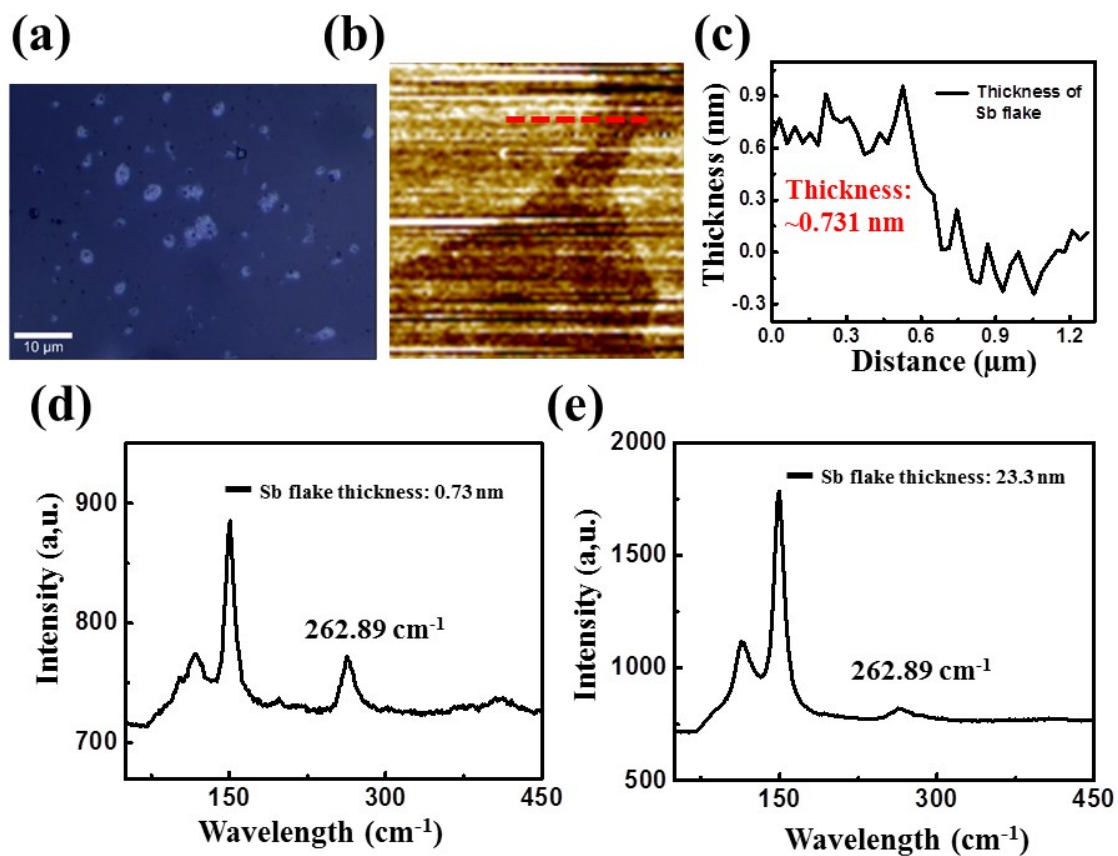
used SEM and OM to observe its surface morphology changes. We operated a commercial atomic force microscope (AFM), i.e. a NX10 Model (Park Systems Co.) for topographic measurements.



Supporting information 1. (a) Schematic of CVD growth of antimony on substrates. (b) and (c) Schematic diagram of the top view of antimony and antimony oxide.



Supporting information 2. (a) and (b) OM images of antimony flake grown on mica substrate with triangle and hexagonal shapes. The scale bars are 10 μm .



Supporting information 3. (a) The OM image of thin Sb flake on SiO₂ substrate. (b) the AFM image of the flake in (a). And (c) is the corresponding line profile of the dashed red line in (b). (d) and (e) are the Raman spectra of Sb flake with thickness ~ 0.73 nm and ~ 23.3 nm, after on hot plate under the same oxidization conditions.

