Atomic Layer Deposition of Antimony (III) Telluride

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We are performing atomic layer deposition (ALD) of antimony- and tellurium-bearing layered, quasi-layered, and 3D materials. On this poster, we focus on growth of Sb_2Te_3, which has a layered structure with van der Waals bonds between Te atoms in adjacent quintuple layers. We have performed ALD of Sb_2Te_3 using bis(trimethylsilyl)tellurium and antimony (III) ethoxide, expanding the set of substrates studied and employing different surface treatments prior to deposition. Growth of a continuous layer is highly dependent on the starting surface through at least the first 500 cycles or growth. We compare our findings to those for ALD of Sb_2Te_3 with the same Te precursor but antimony trichloride as the co-reactant, and to the growth of Sb layers with analogous chloride and alkylsilyl precursors. We thank ONR N0014-18-12511 for support and the NSF 2DCC DMR-1539916 (Anthony Richardella) for some of the substrates.