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Bottom up synthesis of topological crystalline insulator SnTe nanostructures with controlled facets and morphologies ZHEN LI, Indiana University, Bloomington, SHUAI SHAO, NAN LI, Los Alamos National Laboratory, KYLE MCCALL, Indiana University, Bloomington, JIAN WANG, Los Alamos National Laboratory, SHIXIONG ZHANG, Indiana University, Bloomington — Tin Telluride (SnTe) has recently been demonstrated to be a topological crystalline insulator with unique metallic surface states protected by crystalline mirror symmetry. The topological surface properties have been predicted to depend on the surface orientation. By combining synthesis experiments and density functional theory (DFT) calculations, we demonstrate the growth of single crystalline nanostructures of SnTe with controlled facets and morphologies. In particular, by tailoring the growth temperature, we obtained two types of single crystalline nanowires: smooth nanowires dominated by {100}facets at high temperatures, and zigzag nanowires composed of both {100}and {111}surfaces at low temperatures. No {110}facet was observed in any of our nanostructures. The experiment results agree well with our DFT calculations of surface energies. Our device fabrication and preliminary electrical characterizations suggest that both types of nanowires are suitable for transport studies.

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