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Substrate-Independent Vapor-Solid Growth of Bi2Se3 Nanostructures[1] JEROME T. MLACK, ATIKUR RAHMAN, GARY L. JOHNS, Johns Hopkins University, KEN J.T. LIVI, JHU Integrated Imaging Center, NINA MARKOVIC, Johns Hopkins University — We describe a synthesis technique and low-temperature transport measurements of nanostructures of high-purity of topological insulator Bi2Se3. Our growth method is a catalyst-free atmospheric pressure vapor-solid growth, with the use of hydrogen as a carrier gas. It yields abundant amounts of a variety of nanostructures: nanowires, ribbons, platelets, and flakes of different sizes and shapes. Materials analysis shows highly ordered structures of bismuth selenide in all cases. The nanostructures can be used for electronic and optical applications including flexible ones: we show growth results on glass, silicon and flexible mica substrates. Low-temperature measurements of as-grown nanostructures indicate weak-antilocalization and tunable carrier density in all samples. With doping, the transport properties of the samples can be altered to exhibit superconductivity.

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