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One-dimensional Superconducting NbSe2 ZHILI XIAO*, YEW-SAN HOR, ULRICH WELP, YASUO ITO*, JOHN F. MITCHELL, RUSS E. COOK, WAI-KWONG KWOK, GEORGE W. CRABTREE, Argonne National Laboratory, *also Northern Illinois University — Niobium diselenide ($NbSe_2$) in bulk crystal form has been used in the past as a model system to explore vortex physics due to its extremely weak vortex pinning and the pronounced peak effect. The layered crystalline structure of $NbSe_2$ favors the formation of plate-like samples and resists the growth of one-dimensional $NbSe_2$ structures. Here we demonstrate a novel method of synthesizing 1D $NbSe_2$ structures including wires and ribbons. Our two-step approach includes the synthesis of 1D $NbSe_3$ nanostructures and their conversion into $NbSe_2$ through the reduction of selenium while maintaining their shape. The converted 1D $NbSe_2$ samples are superconducting with transition temperatures of about 7.0$\sim$7.2K, similar to that of bulk $NbSe_2$ crystals. The synthesis, structural characterization and physical properties measured with both transport and magnetization will be reported.

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