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Synthesis and characterization of superconducting NbN nanowires and nanoribbons U. PATEL*, Z. L. XIAO*, H. CLAUS, J. HUA*, R. DIVAN, U. WELP, W. K. KWOK, Argonne National Laboratory; *also at Northern Illinois University — The role of one-dimensional nanostructures has recently gained wide importance due to their novel properties and potential applications in electronics. Here, we report a two-step approach to synthesize one-dimensional superconducting NbN nanowires and nanoribbons by converting $NbSe_3$ nanostructures. First, $NbSe_3$ nanostructure precursors were prepared by sintering niobium and selenium powders in an evacuated quartz tube. Subsequently, these $NbSe_3$ nanostructures were transformed into NbN under an atmosphere of ammonia gas at a reaction temperature of up to 1000 $^\circ$C. Superconducting transition temperatures up to 10 K were obtained from both magnetization and four-probe transport measurements. We also carried out morphology and structural characterizations of these NbN nanostructures. This material is based upon work supported by the US Department of Energy, under Award Numbers DE-FG02-06ER46334 and DE-AC02-06CH11357 .

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