Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Conversion of CDW TaS_3 to superconducting TaS_2 nanowires YEW SAN HOR, TAO WU, JOHN F. MITCHELL, Materials Science Division, Argonne National Laboratory, Argonne, Illinois 60439, PETER L. LEE, Advanced Photon Source, Argonne National Laboratory, Argonne, Illinois 60439 — The synthesis of nanowires has attracted considerable interest for their potential applications in many areas of advanced nanotechnologies. Recently we have developed a simple method to fabricate nanowires of a transition metal dichalcogenide through a nondestructive reduction from one-dimensional (1D) trichalcogenide nanostructures.[1] In this report, we present results on synthesis and characterization of TaS_2 nanowires. Our approach includes the synthesis of 1D charge-density-wave (CDW) TaS_3 nanostructure precursors followed by the nondestructive and controlled adjustment of the S composition. The nanowires, as identified with scanning electron microscopy, have a rectanglelike cross section with widths of 20 to 700 nm and lengths of up to a few millimeters. TaS_3 nanowires show the canonical CDW behaviors. However, the converted TaS_2 nanowires show superconducting behavior with Tc $\sim$ 4 K, which is different from the bulk property. [1] Appl. Phys. Lett. 87, 142506 (2005).

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Date submitted: 06 Dec 2005 Electronic form version 1.4