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Synthesis of metallic ReO_3 nanowires DONGSHIN MYUNG, Department of Chemistry & Nano Science, Ewha Womans University, JEONG MIN BAIK, School of Mechanical and Advanced Materials Engineering, Ulsan National Institute of Science and Technology, MYUNG HWA KIM, Department of Chemistry & Nano Science, Ewha Womans University — Rhenium trioxide (ReO_3) is well known as an unusual transition metal oxide with unexpectedly high electrical conductivity close to that of copper. We present the synthesis of highly crystalline metallic rhenium trioxide (ReO_3) nanowires. ReO_3 nanowires were grown on a 200 nm silica-covered Si (001) wafer by atmospheric-pressure chemical vapor deposition (APCVD) at about 300 ° without any catalyst. The wafer was placed in the quartz boat approximately 15 cm downstream from the fine mashed ReO_3 powder and heated at 320 ° with flowing of high purity Ar (500 sccm) for 2 h and then kept at 450 ° for an additional 3 h. The two-step heating enhanced the growth of ReO_3 nanowires. The structures and morphologies were examined using scanning electron microscopy (FE-SEM) and high-resolution electron microscopy (HRTEM). Based on HRTEM, the ReO_3 nanowires exhibit a core of perfect cubic perovskite type single crystal structure with a shell of thin amorphous and disordered structures of less than 2 nm in the near surface layers. Possibly this is due to proton intercalation induced by the surface reaction of single crystal ReO_3 with water.

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