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Growth and properties of WO3, NaxWO3, and KxWO3 thin films. AKIO TSUKADA, SEUNG SAE HONG, ROBERT HAMMOND, THEODORE GEBALLE, MALCOLM BEASLEY, Geballe Laboratory for Advanced Materials, Stanford University — We report optimization of thin-film growth conditions and films properties of WO3, NaxWO3, and KxWO3. Films are grown by pulse laser deposition and used substrates are (100) LaAlO3 (a $\sim$ 3.788 A) and (111) Y-ZrO2 (3.63 A). Growth temperature and oxygen pressure are varied from 600C to 300C and from 10 mTorr to 1000 mTorr, respectively. WO3 are formed in monoclinic or tetragonal structure on LaAlO3 substrates. Films are insulators and temperature dependence of resistivity shows the variable range hopping with Coulomb interaction like behavior [resistivity is proportional to exp(1/T)ˆ(1/2)]. On Y-ZrO2 substrates, WO3 are formed in mixed structure of hexagonal and tetragonal due to an epitaxial effect [(111) Y-ZrO2 substrate has hexagonal surface]. KxWO3 are formed in hexagonal structure on both substrates. a- and c-axis oriented films are obtained on LaAlO3 and Y-ZrO2 substrates, respectively. KxWO3 films show superconductivity at Tc(onset) $\sim$ 4 K and Tc(zero) $\sim$ 2 K. This work is supported by Air Force Office of Scientific Research.

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