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Tunneling Spectroscopy of MoN and $Nb_xTi_{1-x}N$ Thin Films Grown by Atomic Layer Deposition[1] CHAOYUE CAO, Illinois Institute of Technology, NICKOLAS GROLL, JEFFREY KLUG, NICHOLAS BECKER, SERDAR ALTIN, THOMAS PROSLIER, Argonne National Laboratory, JOHN ZASADZINSKI, Illinois Institute of Technology — Tunneling I(V) and dI/dV vs. V are reported on superconducting thin films of MoN and $Nb_xTi_{1-x}N$ using a point contact method with a Au tip. The films are grown by the chemical process of atomic layer deposition (ALD) onto various substrates (Si, quartz, sapphire) held at 450 C. Resistively measured superconducting Tc values up to 12K and 13K are found for the MoN and $Nb_xTi_{1-x}N$ respectively. Artificial tunnel barriers (1-3 nm thick) of Al_2O_3, also grown by ALD, are shown to provide much improved tunneling characteristics compared to the native oxides. Relatively high quality gap features are observed with zero-bias conductance values as low as $\sim$ 10% of the high bias values. Gap parameters $\Delta \sim$ 2.0meV are found for the MoN and $\Delta \sim$ 2.0-2.4 meV for the $Nb_xTi_{1-x}N$ which follow the BCS temperature dependence and close near the measured film Tc indicating bulk superconductivity at the surface. The suitability of such conformal ALD grown films for potential superconducting devices is discussed.

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