Abstract Submitted
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Study of low-temperature resistivity minimum and Hall Effect in pulsed laser deposited single crystalline titanium nitride (TiN) films[1] DHANANJAY KUMAR, RAHUL PONNAM, NIKHIL MUCHA, ABEBE KEBEDE, A.K. MAJUMDAR, North Carolina AT State Univ — Titanium nitride (TiN) films were grown by a pulsed laser deposition technique using a variety of deposition parameters such as substrate temperature, ambient gas pressure, target-substrate distance, substrate materials, etc. The TiN thin films fabricated at temperatures in the range of 500-800 C in vacuum ambient are found to be epitaxial with (111) orientation. Low-temperature transport properties were systemically in TiN films with different room temperature resistivities (100-500 μohm-cm) under an applied magnetic field from 0 to 5.0 T. The temperature dependence of resistivity shows a generally minimum behavior at low temperatures (T<40 K) under various applied fields. Best fittings were made by considering both the electron-electron (e-e) interactions in terms of $T^{1/2}$ dependence and the Kondo-like spin dependent scattering in terms of ln T dependence. The Hall measurements and data analysis have shown that the charge carriers are electron in metallic TiN films. For example, the Hall coefficient and electron density at 300 K were found to be -6.410^{-5} cm^3/C and 9.7 10^{22}/cm^3, respectively.

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