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Electrical properties of epitaxial junctions between Nb:$SrTiO_3$ and optimally doped, underdoped and Zn-doped $YBa_2Cu_3O_{7-\delta}$ WEGDAN RAMADAN[1], S.B. OGALE[2], S. DHAR, S.R. SHINDE, M.S.R RAO, T. VENKATESAN, Center for Superconductivity Research, Department of Physics, University of Maryland — Epitaxial thin films of optimally doped, underdoped and Zn-doped $YBa_2Cu_3O_{7-\delta}$ were grown on single crystal (001) Nb:$SrTiO_3$ substrates by pulsed laser deposition (PLD) and the electrical properties of the corresponding interface junctions were examined. The growth conditions were optimized in each case to get the appropriate crystalline quality of the films as well as the desired normal state and superconducting properties. The films/heterointerfaces were characterized by x-ray diffraction, Rutherford backscattering channeling (RBSC) spectrometry in normal and oxygen resonance modes, magnetic susceptibility, four probe in-plane resistivity, and the temperature dependent junction current-voltage (I-V) characteristics. Non-linear I-V curves (forward and reverse) were obtained in all the cases, revealing some characteristic differences and interesting temperature evolution. These data were analyzed within the framework of a standard description of the transport across the metal-semiconductor (Schottky) interface and the curve fitting parameters were extracted in each case. An attempt is made to relate the observed parametric differences to the existing knowledge about the normal state and superconducting properties of the films.

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[2]Membership No. 60013732

Wegdan Ramadan
Center for Superconductivity Research, Department of Physics
University of Maryland, College Park, MD 20742-4111

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