

Fabrication of Nb/Al Superconducting Tunnel Junction as a Novel Astronomical Detector

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We report the fabrication of a set of single pixel Nb/Al-based superconducting tunnel junction (STJ). The experimental junctions consist of various sizes of pixels (20, 40, 60, and 80 μm^2), and standard thin film making processes including UV photolithography and CVD (Chemical Vapor Deposition) techniques are applied for junction fabrication. Total 5 polycrystalline layers (Nb/Al/AlOx/Al/Nb) are deposited on a 2 inch silicon wafer. The junctions are cooled down to one tenth of the critical temperature (~ 1 K for Nb junction) for normal operation. By measuring IV-curve, we can determine performance indicators such as energy gap, FWHM energy resolution, resistance, resistivity, etc. STJ technique offers attractive features for astronomical observation. They include : a) intrinsic wavelength discrimination, b) extremely broad spectral range, c) very high quantum efficiency, d) high time resolution. The usability and technical agenda of STJ as a novel astronomical detector will be discussed.