NbN/AlN/NbN Superconducting Tunnel Junctions Fabricated for HSTDM

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Terahertz, defined as 0.1-10THz, is an important frequency regime for astronomical observation. THz observations on ground-based telescopes are rather limited due to strong absorption by the Earth's atmosphere. Space telescopes can overcome this constraint. China is planning to launch a space station around 2020. It will be in full operation hopefully around 2022, with a 2-meter telescope flying with it in a common orbit. Onboard this telescope, there will be a high sensitivity terahertz detection module (HSTDM) based on a niobium nitride (NbN) superconductor-insulator-superconductor (SIS) receiver system operating at 0.41-0.51THz band [1].

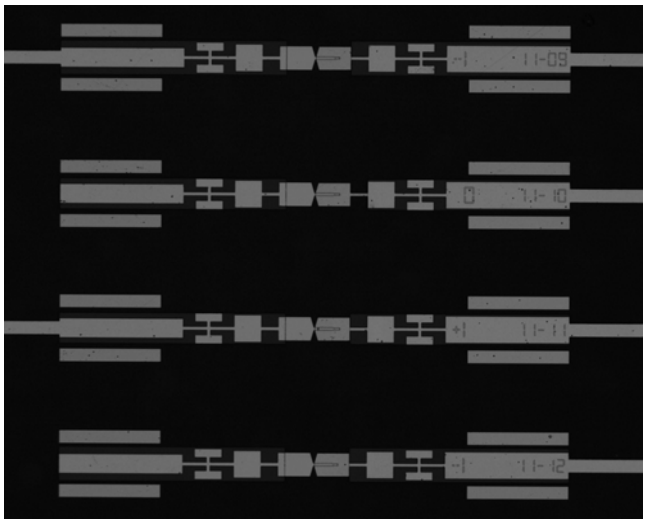

Fig. 1. NbN/AlN/NbN tunnel junctions fabricated in a cleanroom at PMO.

High sensitivity NbN SIS mixers have been proved to be of good potentials for space applications as they can work at relatively high temperatures up to 10K and have good stability [2]. Fabricating high-quality NbN SIS junctions remains challenging [3], especially for space applications. In this paper, we will mainly introduce our work on the fabrication of NbN superconducting tunnel junctions for HSTDM, including the growth of superconducting NbN films and the fabrication of high-Jc SIS junctions.

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