Highlights

RESEARCH AREA 3 - **Quantum Science and technologies** - 2024

"Single photon detection in NbRe superconducting microstrips"

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Detection of single infrared photons in superconducting microstrips of 4 nm thick disordered $Nb_{0.15}Re_{0.85}$ has been investigated. Microstrips with a critical temperature of 5.15 K and widths from 1.0 to 2.5 μm have been fabricated by optical lithography. We demonstrate single photon detection sensitivity at 1.5 μm wavelength at a temperature of 1.79 K. By investigating the detection process at this temperature, we find that the current bias threshold is at 21% of the depairing current. This threshold is similar to what should be observed in typical amorphous superconductors, which confirms that ultrathin disordered $Nb_{0.15}Re_{0.85}$ is an interesting material for superconducting microstrip single photon detectors that operate above 1 K.

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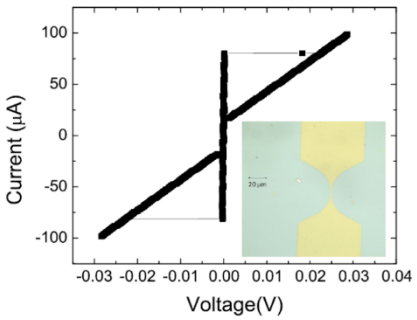

Fig. 1: Current–voltage characteristic at 1.79 K for a typical device. Inset: image of the same microstrip as realized by optical microscope.

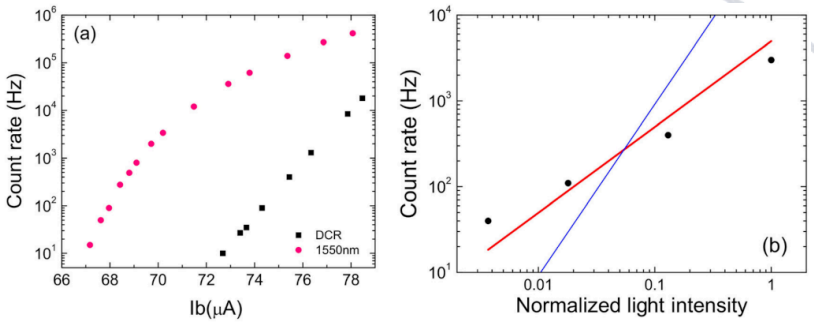

Fig. 2: Single photon detection in NbRe microstrip at 1.79 K. (a) Dark count rates (black squares) and photon count rates (magenta circles) at 1.5 μm. (b) The photon count rate as a function of the light attenuation at a bias current of 69.1 μA (black circles). The best single photon response fit (thick red line) and the best two-photon response (thin blue line) are also shown that affirms the single photon response of the NbRe microstrip.