New Generation of Nanowire NbN Superconducting Single-Photon Detector for Mid-Infrared

Yuliya Korneeva, Irina Florya, Alexander Semenov,
Alexander Korneev, and Gregory Goltsman

Abstract - We present a break-through approach to mid-infrared single-photon detection based on nanowire NbN superconducting single-photon detectors (SSPD). Although SSPD became a mature technology for telecom wavelengths (1.3 - 1.55 μm) its further expansion to mid-infrared wavelength was hampered by low sensitivity above 2 μm. We managed to overcome this limit by reducing the nanowire width to 50 nm, while retaining high superconducting properties and connecting the wires in parallel to produce a voltage response of sufficient magnitude. The new device exhibits 10 times better quantum efficiency at 3.5 μm wavelength than the "standard" SSPD.

Index Terms - Infrared single-photon detectors, superconducting device fabrication, superconducting NbN films, thin film devices.

IEEE/CSC & ESAS European Superconductivity News Forum (ESNF), No. 15, January 2011
The published version of this manuscript appeared in *IEEE Transactions on Applied Superconductivity* 21, Issue 3, 323 - 326 (2011)