Update on the fabrication and performance of 2-D arrays of superconducting Magnesium Diboride (MgB_2) thermal detectors for outer-planets exploration.

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Abstract

Detectors with better performance than the current thermopile detectors that operate at room temperature will be needed at the focal plane of far-infrared instruments on future planetary exploration missions. We will present an update on recent results from the 2-D array of MgB_2 thermal detectors being currently developed at NASA Goddard. Noise and sensitivity results will be presented and compared to thermal detectors currently in use on planetary missions.

1. Introduction

In this poster we present results of noise and sensitivity (D*) measurements from a pixel in a 2-D array of superconducting MgB_2 thin film. The 2-D array is maintained at the superconducting transition temperature of an architectured, high resistance, MgB_2 thin film on a SiN-coated Si substrate

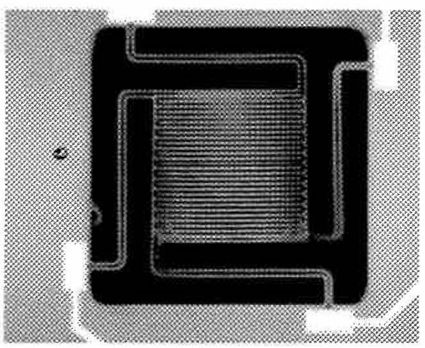

Figure 1: Single pixel in a 2-D array of MgB2 bolometers.

2. Summary and Conclusions

Unlike Yttrium Barium copper oxide (YBCuO), Magensium Diboride (MgB2) grows nicely on SiN. By architecturing it into a long meander line we have been able to obtain high resistance (~ 2kΩ) MgB2 thermistors on the back of each pixel. The characterization of the 2-D array is underway and a pixel sensitivity (D*) of ≥ of 10^{10} cmHz$^{1/2}$/W is expected, which is over an order of magnitude higher that thermopiles currently used on the CIRS instrument on Cassini.

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