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Magnesium Diboride (MgB2) thermal detector array for Infrared Spectrometers and Cameras on Planetary Exploration Instruments.

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Abstract

Recent results from the 2-D array of MgB_2 thermal detectors being currently developed at NASA Goddard are presented. NEP and sensitivity (D*) results show significant improvement compared to thermal detectors currently in use on planetary instruments. A MgB2 thin-film bolometer, with a non-optimized radiation absorber, has been designed, fabricated and characterized. The bolometer pixel, with no separate absorber, gave an optical detectivity D* = ~1.6 x 10^{10} cm√Hz/W operating at 30 Hz.

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.

2. Figures

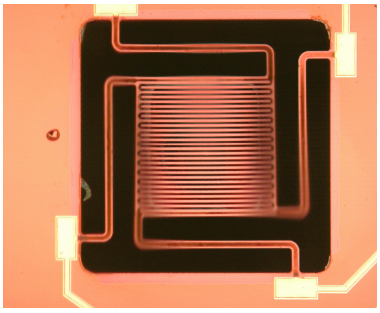

Figure 1: Single pixel in a 2-D array of MgB2 bolometers.

3. Summary and Conclusions

Magensium Diboride (MgB2) grows nicely on SiN allowing the development of 2-D arrays of thermal detectors.
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. Current results show that the D* obtained is over an order of magnitude higher than thermopiles currently used on the CIRS instrument on Cassini. The sensitivity D* is expected to be even higher when an IR absorber will be added.

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