

Direct Deposit Opaque Pixel

Executive Summary

Leonardo have demonstrated the ability to apply an opaque mask to an active area of an MCT focal plane array, thus creating blind reference pixels in the MCT. By ensuring that the applied layer absorbs the radiation, rather than reflecting it, the masking layer has minimal impact on the adjacent un-masked pixels. This enables an improvement in the sensitivity of a focal plane array by allowing for the compensation of temporal noise effects during image processing and thus enables the instrument to resolve very faint objects, previously masked by noise.

The process has been successfully demonstrated using well established thin film processes in house, on both Leonardo long wave devices and short wave avalanche photo diode arrays. The process has been shown to exhibit low levels of crosstalk, no measureable effect on the dark current of either the masked or exposed elements and no degradation to the MCT array. Devices from both wavebands have been subjected to a range of environmental tests with no loss of performance, either to the layer or the MCT.

The Direct Deposit Opaque Pixel contract (reference 4000133646/20NL/AR) details the development of a Fabry Perot type structure for use with cooled detectors. The project has successfully demonstrated layers able to limit the transmission through the masking to around 0.25% in the Long wave, together with the reflection of 0.5% at the target wavelength. Short wave avalanche photo diodes demonstrated similar levels of reflection, with levels of transmission of around 3%.

This development of these processes has demonstrated that we can implement this type of structure reliably onto our array technologies. This opens the way for future science missions to exploit this technique to enhance the measurement capability.

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