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Toward a single-chip TECless and NUCless InGaAs SWIR camera with 120dB Intrinsic Operation Dynamic Range

This paper describes NIT's single-chip InGaAs SWIR camera with more than 120dB instant operational dynamic range with an innovative CMOS ROIC technology, so called MAGIC where the pixel is driven in a solar cell mode, invented and patented by New Imaging Technologies. A 640x512-pixel InGaAs 15µm pitch photodiode array, designed by NIT, has been hybridized on this new generation CMOS ROIC. With NIT's MAGIC technology, the sensor's output follows a precise logarithmic law in function of incoming photon flux and gives instant operational intra-scene dynamic range (DR) better than 120 dB. Neither TEC nor NUC is needed for room temperature operation. The camera can be switched on and off instantly, ideal for all the portable battery operated SWIR band observation applications. The measured RMS noise and FPN noise on the sensor in dark conditions are 0.4 mV and 0.27 mV respectively. The signal excursion from pixel is about 300mV over the 120 dB dynamic range. The FPN remains almost constant over the whole operation dynamic range. The NEI has been measured to be 3,71E+09 ph/s/cm2 with 92 equivalent noise electrons at 25Hz frame rate.

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