



Sensors

Quantum Well Infrared Photodetector (QWIP)

The largest format GaAs QWIP array ever fabricated.

NASA Goddard Space Flight Center has developed a GaAs quantum well infrared photodetector (QWIP) array consisting of 1920 x 2048 (approximately 4 million) pixels. For comparison, the current state-of-the-art in QWIP array format is 1024 x 1024 pixels. Thus this technology represents a 4x increase in pixels.

For example, if an instrument equipped with a 1024 x 1024 array is capable of resolving a patch of the Earth's surface 100m x 100m from an orbiting satellite such as LANDSAT, the same instrument can image a 50m x 50m area with the new 2K x 2K array. Improved image resolution is a key science driver in many NASA Earth observing and astronomy missions.

BENEFITS

- Larger image size
- Higher resolution
- Versatile (can be adapted to numerous applications)

technology solution

NASA Technology Transfer Program

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THE TECHNOLOGY

The QWIP array is based on the corrugated or C-QWIP structure. The superlattice is designed for a peak wavelength response at ~12 μ m. The optimum operating temperature for this structure is

The QWIP technology improves image resolution and increases the image footprint size. An increase in the array size can lead to both an increase in image resolution and a larger imaging field.

The fabrication process can be adjusted to produce detector arrays that are sensitive in the infrared region from near 4.5 micrometers to as long as 16 micrometers.

APPLICATIONS

The technology has several potential applications:

- ➔ High resolution IR imaging from space
- ➔ Studying troposphere and stratosphere temperatures and identifying trace chemicals
- ➔ Tree canopy energy balance measurements
- ➔ CO₂ absorption
- ➔ Coastal erosion
- ➔ Ground based astronomy
- ➔ Medical diagnosis
- ➔ Location of forest fires and residual warm spots
- ➔ Location of unwanted vegetation encroachment
- ➔ Monitoring crop health
- ➔ Locating power line transformer failures in remote areas
- ➔ Locating new sources of spring water
- ➔ Monitoring food spoilage, ripeness and contamination

PUBLICATIONS

Patent Pending

National Aeronautics and Space Administration

Strategic Partnerships Office

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