

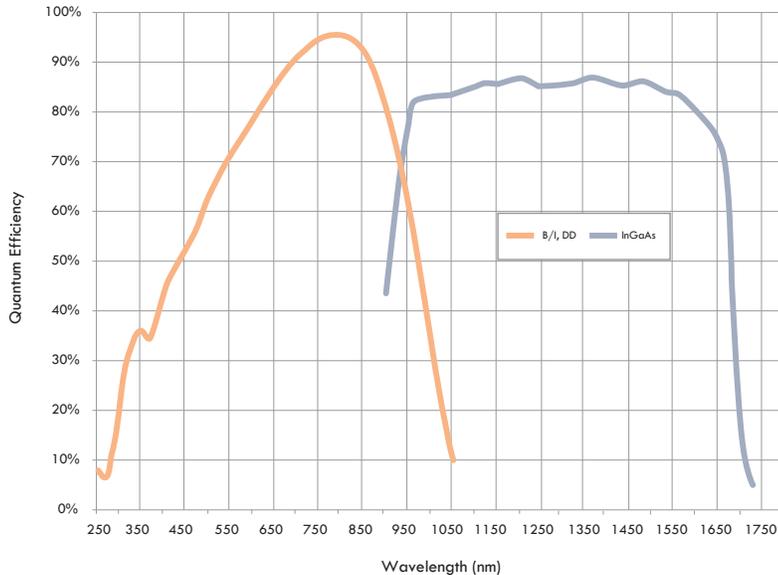
NIRvana™

World's First
Scientific-Grade
Near IR
Camera



**TELEDYNE
PRINCETON INSTRUMENTS**
Everywhereyoulook™

Scientific, Deep-Cooled InGaAs FPA Camera Now Available for NIR/SWIR Work!



InGaAs FPA vs. Si-CCD
Back-illuminated, deep-depletion silicon CCDs improve sensitivity in the NIR. Nonetheless, InGaAs FPAs provide better QE above 900 nm.

Go where you've only dreamt of going before with the new NIRvana:640* from Princeton Instruments, the world's very first scientific-grade camera system to feature a deep-cooled, large-format InGaAs (indium gallium arsenide) array!

The powerful NIRvana™ is designed to provide researchers unprecedented utility for low-light near infrared (NIR) or shortwave infrared (SWIR) imaging and spectroscopy applications that require superb sensitivity from 0.9 μm to 1.7 μm .

The NIRvana:640 combines the advantages of the latest-generation 640 x 512 InGaAs focal plane array (FPA) with both deep sensor cooling

and low-noise readout electronics to deliver the highest possible sensitivity in this important wavelength range.

Thanks to state-of-the-art vacuum technology developed at Princeton Instruments, the NIRvana:640 reaches temperatures as low as -85°C by means of convenient, maintenance-free thermoelectric cooling. In this way, heat-generated charge is minimized to achieve the best possible signal-to-noise ratio! Feel free to select either built-in air or liquid cooling, or a combination of the two, for versatile use in thermal- and vibration-sensitive environments.

* Formerly known as the PloNIR:640

Take Your Research to the Next Level!

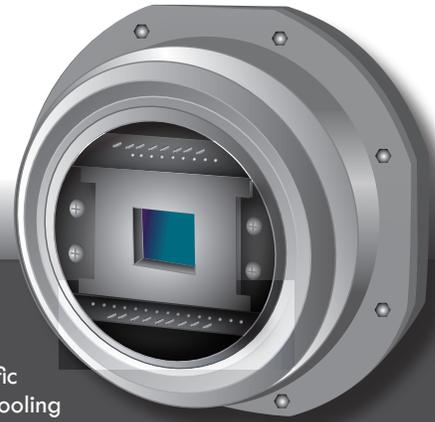
Control Is Key

The NIRvana:640 also features a Gigabit Ethernet (GigE) data interface for remote operation from up to 50 meters away and delivers a maximum frame rate of 110 frames per second at full resolution.

Control, as always, is key. The NIRvana:640 is available with the latest Princeton Instruments LightField™ 64-bit data acquisition software, which affords complete control over all camera hardware features via an exceptionally intuitive user interface. LightField provides automatic defect

correction, exposure control up to minutes, and a host of innovative functions for easy capture and export of imaging and spectral data.

Additionally, the NIRvana:640 can be integrated into OEM systems using the PICAM™ SDK, a free software development kit from Princeton Instruments.



Cooling Is Critical

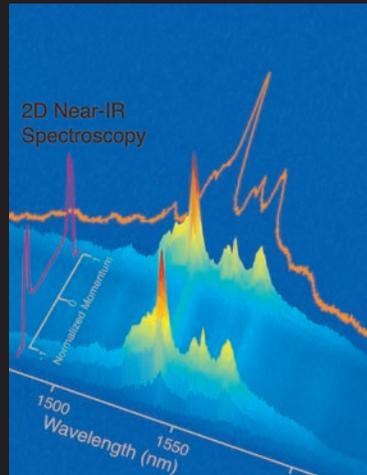
Due to the low bandgap of InGaAs material, InGaAs FPA cameras have much higher dark current than Si-CCD cameras. Therefore, it is absolutely critical to minimize InGaAs FPA cameras' dark noise via deep cooling. Scientific InGaAs FPA cameras such as the NIRvana:640 use advanced thermoelectric cooling and vacuum technology to cool sensors down to -85°C and achieve the lowest possible dark noise.

The NIRvana:640 uses an all-metal, hermetically vacuum-sealed chamber with a single vacuum window for maintenance-free operation:

- State-of-the-art design cools sensor down to -85°C .
- Single optical window with double-sided AR coating provides the highest photon throughput, $>98\%$ transmission, in the NIR band.
- Hermetic seals afford maintenance-free operation. No vacuum re-pumping is necessary over the camera system's long lifetime.
- High vacuum levels deliver deep sensor cooling and condensation-free operation.
- Built-in air or liquid cooling options allow researchers to utilize a built-in fan for optimal ease of use or an external liquid circulator for vibration-free operation (the built-in fan can be turned off via software).
- A proprietary cold-shield minimizes the detection of unwanted ambient NIR radiation. The cold-shield is a metal component that sits on top of the InGaAs FPA and is cooled to the same temperature as the sensor. It limits the f-cone of the sensor (typically $f/1.5$) and reduces background for lower overall noise.
- Cooling shifts the long-wavelength cutoff by about 8 nm for every 10°C , reducing unwanted background noise.

Take Your Research to the Next Level!

Ready for Myriad Physical and Life Science Applications!

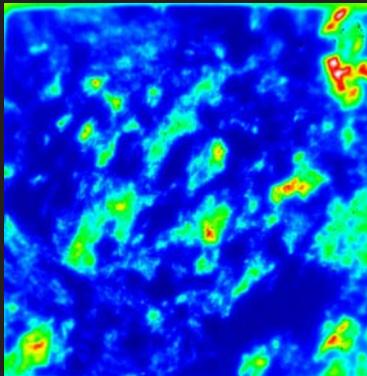


Topographical rendering of energy-momentum-resolved spectroscopy of a trivalent-erbium-doped yttrium oxide thin-film sample highlights the 1535 nm telecom line in the erbium. Courtesy of Dr. Rashid Zia, Brown University, Providence, Rhode Island.

Princeton Instruments' deep-cooled NIRvana InGaAs FPA camera system is quickly setting an impressive new performance benchmark for scientific NIR/SWIR imaging and spectroscopy!

The highly sensitive NIRvana:640 enables novel research and industrial applications in many advanced areas of exploration, including:

- Multicrystalline silicon solar cells
- Semiconductor failure inspection
- Multispectral imaging and spectroscopy
- Deep tissue imaging
- Single-walled nanotubes (SWNTs)
- Singlet oxygen imaging
- NIR fluorescence and absorbance
- Astronomy
- Photoluminescence imaging of photovoltaic materials



Photoluminescence image of a textured solar cell.
Courtesy of Dr. Steven Johnston, NREL, Golden, Colorado.



Teledyne Princeton Instruments | Main Office- (USA) |
Tel: +1 609.587.9797 | pi.info@teledyne.com

Copyright © 2012 Princeton Instruments, Inc. All rights reserved.

All brand and product names are the trademarks or registered trademarks of their respective owners and manufacturers.

Take Your Research to the Next Level!

RevA0