

SWIR applications - Microscopy



COMPANY OVERVIEW



20 EMPLOYEES
PARIS, FRANCE



SWIR & CMOS
SENSORS & CAMERAS



>85% EXPORT



15
YEARS OF
RESEARCH

20
PATENTS



INDUSTRY



AIR & SPACE



HDR SOLUTIONS IN
VISIBLE AND INFRARED

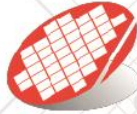


DEFENSE & SECURITY



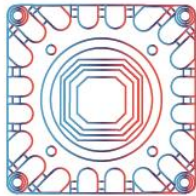
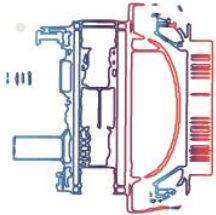
SCIENCE



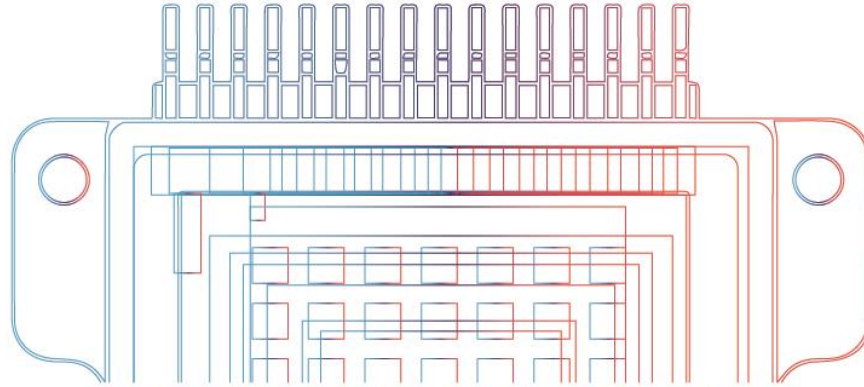


NIT

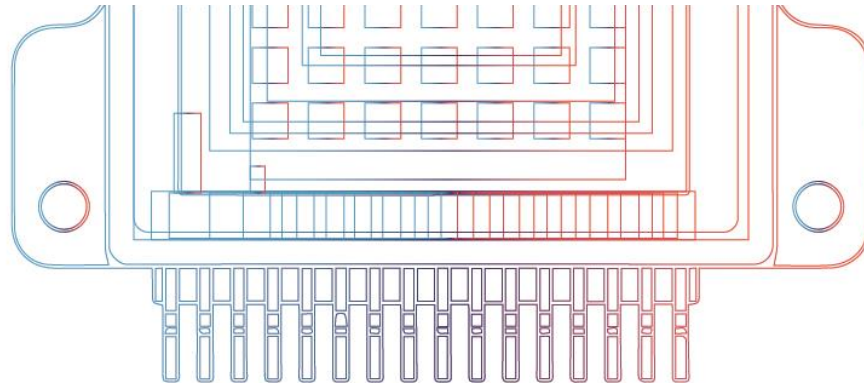
www.new-imaging-technologies.com



MACHINE VISION, DEFENSE & SECURITY,
SURVEILLANCE INDUSTRIAL VISION, ACTIVE
IMAGING, WELDING, SEMICONDUCTOR &
WAFER INSPECTION, THERMOGRAPHY



SWIR TECHNOLOGY 900 – 1700nm



● ○ OUR PRODUCTS FOR YOUR APPLICATION



▶ WiDy SenS

- NSC1601
- High Sensitivity and HDR
- 15°C sensor regulation
- Gated Imaging option



▶ HiPe SenS

- VGA NSC1902
- High Sensitivity
- Small form factor (<350g)
- -50°C cooling capacity
- Low dark current
- Up to 60s exposures



▶ WiDy SWIR

- NSC1201 & 1401
- HDR solution
- Cost effective solutions

HiPe SenS for Microscopy applications

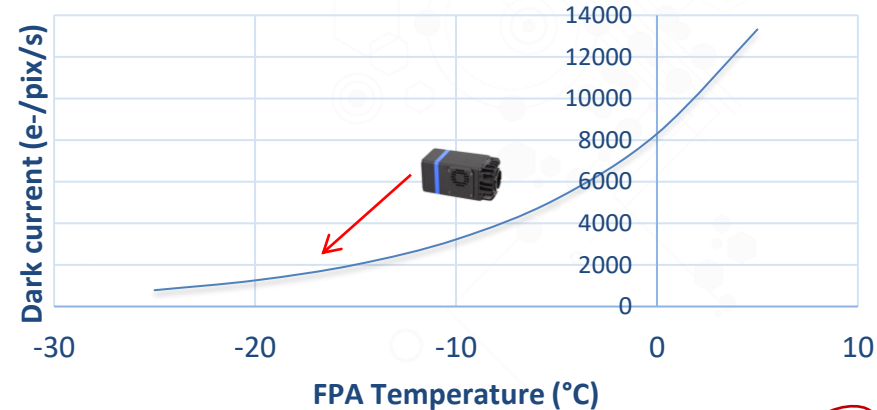
NIT has developed a specific sensor and camera

- Low dark current and longer exposure are required because of low signal application
 - **>85%** peak Quantum Efficiency
 - Typical dark current : **2000e-/pixel/s @-15°C**,
1200e-/pixel/s @-20°C
 - **<40e⁻** Readout Noise (High gain mode)
- Cooling capacity : **>50°C** below ambient
- Compact camera: **<350g** / 46x57x106mm – Modular design
- Software : GUI / SDK / MicroManager adapter / ...
- Cost effective solution – Best price to performance ratio on the market



HiPe SenS

Dark current (e-/pixel/s) vs FPA temperature (°C)
Dark current doubling Temperature = 7,3°C



●○ SWIR other applications: Biomedical Imaging

SWIR open new opportunities of deep tissue imaging for **In-vivo application**

Traditionally, for deep tissue imaging ionizing radiation is used (X-ray and γ -ray) but poses some risks to biological tissue

Photoluminescence Imaging is preferred, using fluorescent Dye and excitation laser. Traditionally Visible and NIR band have been used:

- **Visible band (400-650nm) is used only for superficial tissues** (strong scattering and absorption)
- **NIR band or NIR1 (850-900nm)** have been used in the last 20 years

SWIR or NIR2 (1300-1400nm) have following advantages:

- **Stronger transmission than NIR band**
- **Lower scattering**
- **Commercially available and FDA approved dyes show strong emission in the NIR2 band**

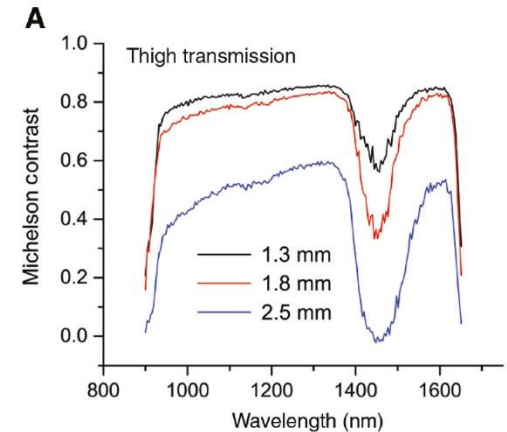
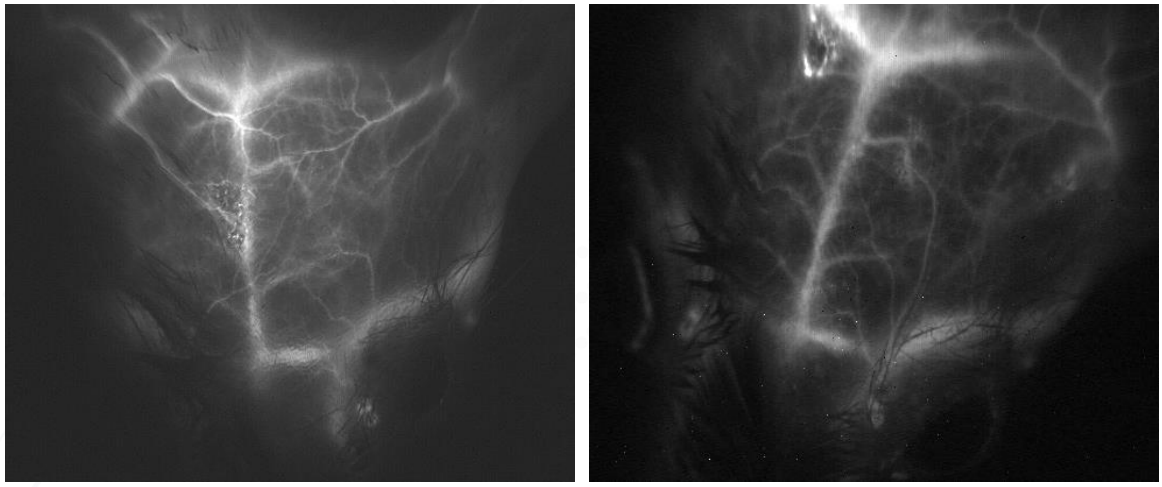


Figure 1: Transparency of biological tissue in SWIR.

●○ SWIR other applications: Biomedical Imaging



Example 1 - In-vivo mouse blood vessel imaging with NIT SWIR camera

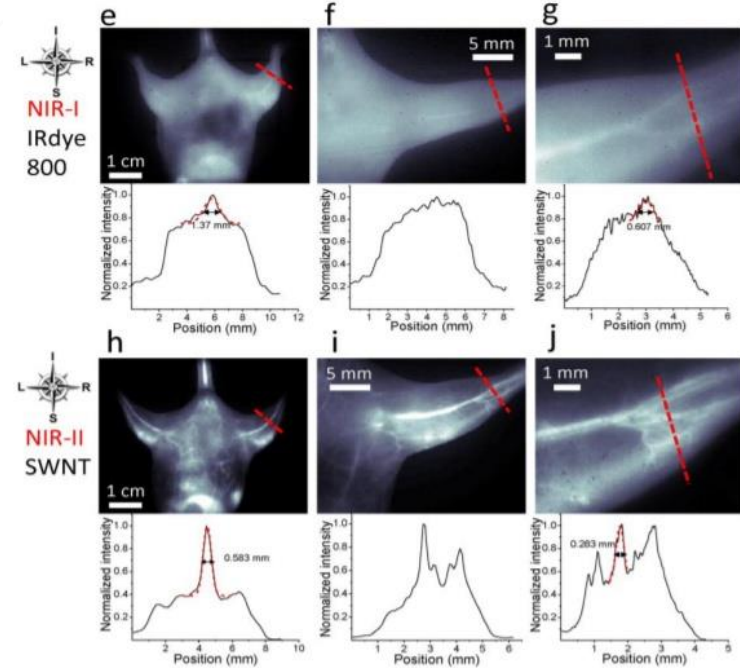


Courtesy of Pembroke Instruments

●○ SWIR other applications: Biomedical Imaging

Example 2 - Comparison between NIR and SWIR:

- NIR I (850-900nm) and SWIR (1300-1400nm)
- SWIR imaging brings **more contrast, more details** and **better image quality**
- Image has been made using excitation of a 785 nm laser



Reference: Multifunctional in vivo vascular imaging using near-infrared II fluorescence Guosong Hong^{1,3}, Jerry C. Lee^{2,3}, Joshua T. Robinson¹, Uwe Raaz², Liming Xie¹, Ngan F. Huang², John P. Cooke² & Hongjie Dai¹

●○ SWIR industrial application

1 - Wafer, DIE, OLED panel inspection

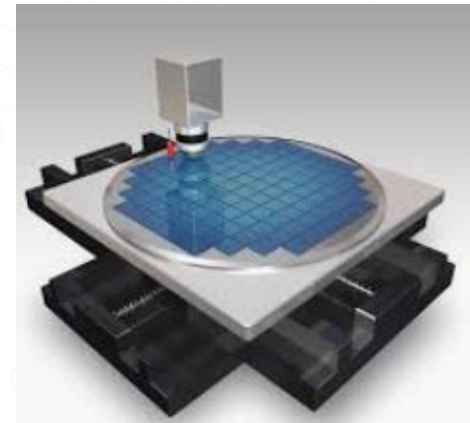
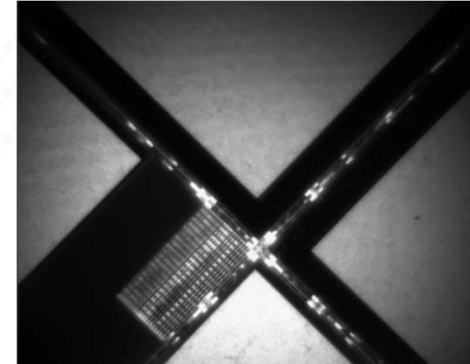
As SWIR transmission through Silicon is much better than Visible/NIR, there are many applications for the use of SWIR Areas and line scan cameras on this area:

- Silicon Brick/Ingot
- Wafer inspection after Ingot dicing
- DIE inspection after wafer dicing
- MEMS inspection after packaging
- Wafer alignment
- OLED Wafer inspection

Thanks to SWIR wavelength, impurities, defects, cracks can be detected.

Good alignment, dimensions can be also verified.

Increasing silicon dies layer count, thickness and new packaging material make NIR obsolete, and SWIR mandatory.



спасибо
شكرا
σας ευχαριστώ
Danke u
Danke
Merci
धन्यवाद
Grazie
ありがとう
谢谢
Terima kasih
Teşekkür ederiz
Thank you
감사합니다
Dziękuję
Gracias



nit

www.new-imaging-technologies.com

Follow us on



●○ EPIC Question

What we can do for you?

- Wide selection of SWIR cameras
- Flexible solutions
 - HDR to high sensitivity
 - 100ns to minute long exposures
 - Different communication interface
 - Modular design
 - ...
- Cost-effective solutions

What you can do for us?

- Partnership
- System integration
- Discuss your application with us