SWIR application
MICROSCOPY

HiPe SenS
for Microscopy applications

Low dark current and longer exposure are required because of low signal application.

- Quantum Efficiency(QE): **>85%** peak
- Typical dark current: **2000e-**/pixel/s @-15°C, **1200e-**/pixel/s @-20°C
- Readout Noise (High gain mode): **<40e-**

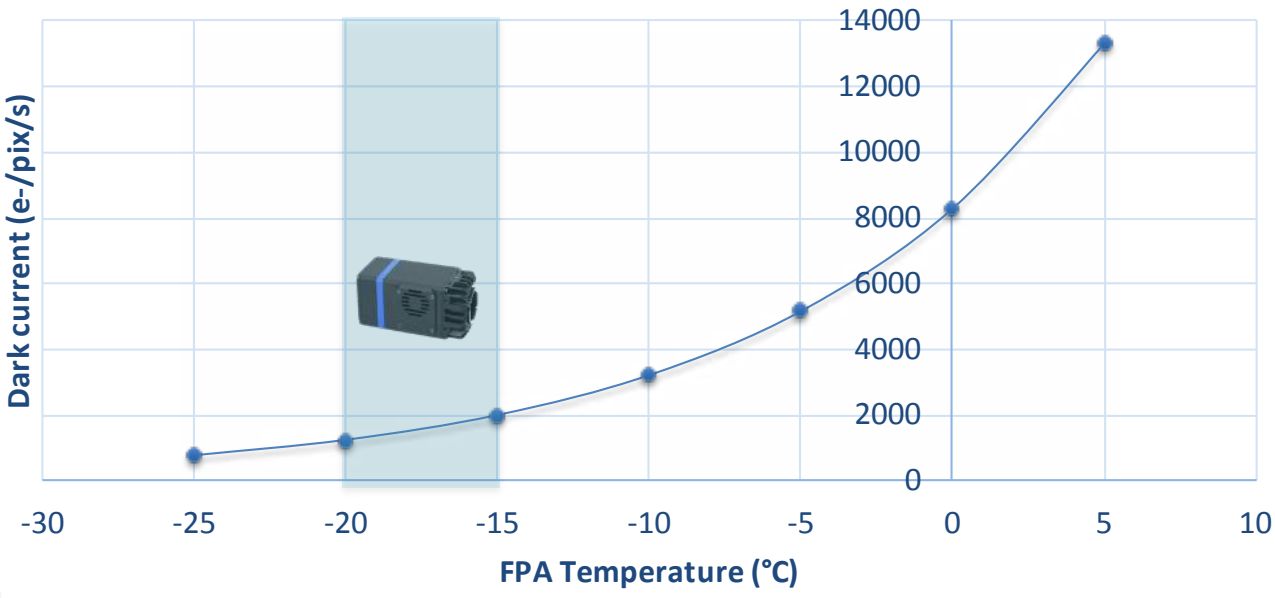
Cooling capacity : **>50°C** below ambient

Compact camera: **<350g** / **46x57x106**mm – Modular design

Software : GUI / SDK / MicroManager adapter / ...

Cost effective solution – Best price to performance ratio on the market

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



Other SWIR applications: Biomedical Imaging

SWIR opens new opportunities of deep tissue imaging for *In-vivo* application. Traditionally, for deep tissue imaging ionizing radiation is used (X-ray an ɣ-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:

1. Stronger transmission than NIR band
2. Lower scattering
3. Commercially available and FDA approved dyes show strong emission in the NIR2 band.

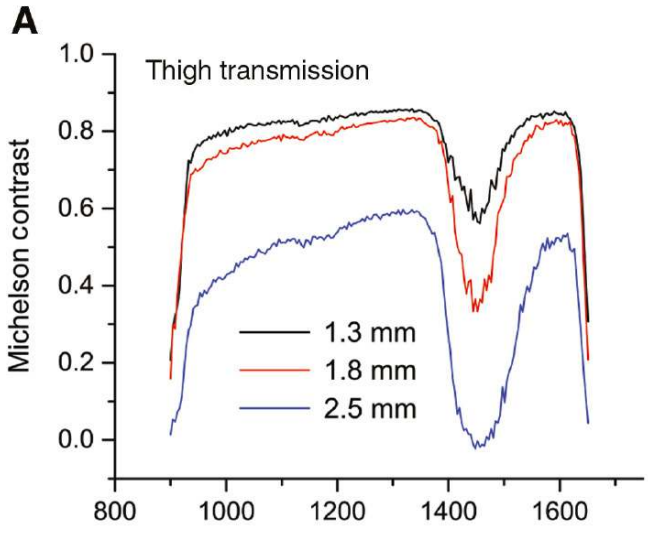


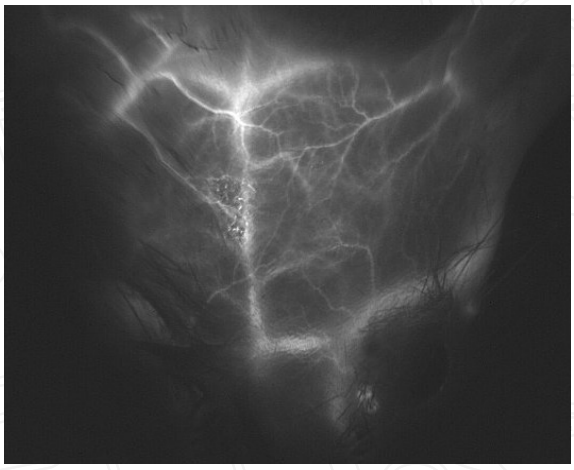
Figure 1. Transparency of biological tissue in SWIR.

Reference: Thimsen, Elijah & Sadtler, Bryce & Berezin, Mikhail. (2017). Shortwave-infrared (SWIR) emitters for biological imaging: A review of challenges and opportunities. Nanophotonics. 6. 10.1515/nanoph-2017-0039.

Other SWIR applications: Biomedical Imaging

EXAMPLE 1

In-vivo mouse blood vessel imaging with NIT SWIR camera



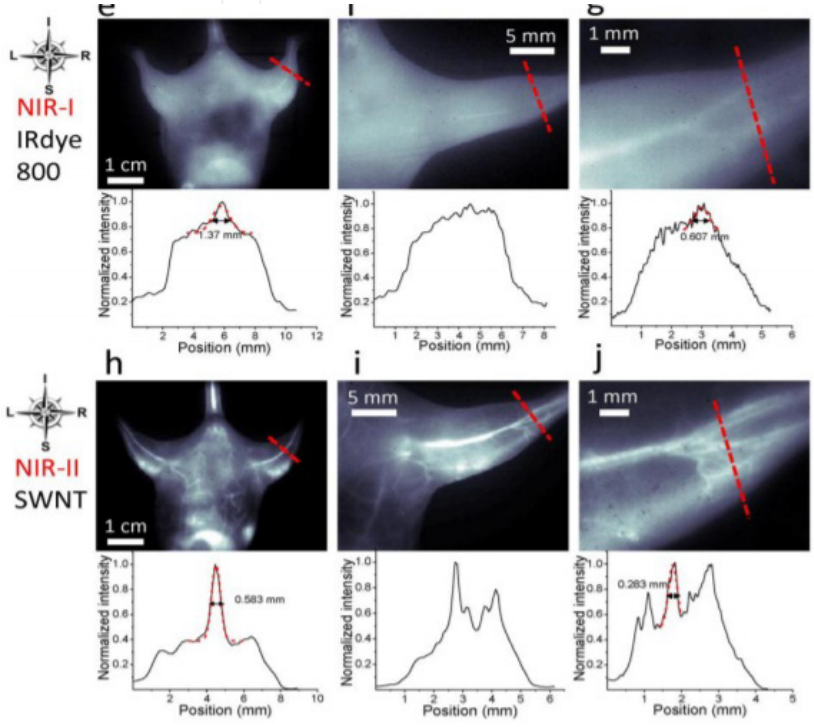
Courtesy of Pembroke Instruments

Other SWIR 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 luminosity of a 785 nm laser.



Reference: Multifunctional in vivo vascular imaging using near-infrared II fluorescence Guosong Hong1,3, Jerry C. Lee2,3, Joshua T. Robinson1 , Uwe Raaz2 , Liming Xie1 , Ngan F. Huang2 , John P. Cooke2 & Hongjie Dai1

SWIR industrial application: 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.

NIT SWIR imaging devices offer an attractive performance/price ratio when it comes to ease the integration into semiconductor/ wafer/ solar panels production lines.

- *SWIR band*
- *High Sensitivity*
- *Small pitch*

www.new-imaging-technologies.com