Private Company

Shortwave infrared photodetector materials and growth technologies

Industrial materials

Background

We are a global leader in advanced materials, known for our expertise in developing innovative solutions across various industries, including electronics and sensing technologies. Shortwave infrared (SWIR) photodetectors are utilized in a wide range of applications, including night vision, spectroscopy, remote sensing, and biomedical imaging. These detectors enable imaging beyond the visible spectrum, making them essential for environments with low lighting, material identification, and non-invasive medical diagnostics. Currently, Indium Gallium Arsenide (InGaAs) is the most widely used semiconductor material for SWIR detection due to its high sensitivity and fast response time. However, InGaAs-based detectors are expensive to manufacture, particularly for detecting longer wavelengths. Additionally, they are primarily fabricated on indium phosphide (InP) substrates, which limits their ability to integrate with complementary metal-oxide-semiconductor (CMOS) technology, the standard platform for modern electronic and imaging systems. This lack of CMOS compatibility poses a barrier to widespread adoption. To address these issues, research is advancing on new materials that offer both lower costs and higher performance, with a focus on improving CMOS compatibility and manufacturability.

What we're looking for

We are looking for new materials and manufacturing approaches to enable the next generation of cost-effective, high-performance SWIR photodetectors. Ideal solutions should balance performance, scalability, reliability, and environmental impact while ensuring seamless integration with modern semiconductor manufacturing. We are interested in materials that satisfy our must-have requirements, with III-V compounds being the most desirable option.

Solutions of interest include:

- SWIR photodetector materials (e.g., InGaAs, InSb, etc.)
- Optimized growth techniques (e.g., heteroepitaxial growth processes)
- 2D materials for monolithic integration

Our must-have requirements are:

- Detection wavelength: 900-1700 nm
- Dark current: 3,000 nA/cm²
- Quantum efficiency: 20%

Our nice-to-have's are:

- Processes that enable the growth of III-V compounds or other suitable materials on low-cost seed substrates like silicon (Si)

What's out of scope:

- Relies on expensive substrates (e.g., InGaAs-on-InP)
- Includes quantum dots (QDs) and organic materials
- Contains RoHS-regulated elements
- Not compatible with thin-film deposition techniques, such as MBE (molecular beam epitaxy), MOCVD (metal-organic chemical vapor deposition), and HVPE (hydride vapor phase epitaxy)

Acceptable technology readiness levels (TRL): Levels 3-6

1. Basic principles observed
2. Concept development
3. Experimental proof of concept
4. Validated in lab conditions
5. Validated in relevant environment
6. Demonstrated in relevant environment
7. Regulatory approval
8. Product in production
9. Product in market

What we can offer you

Eligible partnership models:

- Sponsored research
- Co-development
- Licensing
- Material transfer

Benefits:

Sponsored Research

Up to 50,000 USD for a proof-of-concept study to demonstrate industrial relevance.

Tools and Technologies

Access to our foundry.

Please contact the University of South Florida Technology Transfer office representative for submission – Karla Schramm at kschramm@usf.edu