

## **Title: High resolution infrared imaging sensors with low power consumption**

### **Objective**

The objective is to identify the best detector design and fabrication techniques for high-resolution type-II superlattice (T2SL) infrared imaging sensors that will result in low power consumption and small size of the detector unit.

### **Abstract**

Infrared (IR) imaging sensors used for surveillance, gas detection, fire protection, etc., usually need to be cooled to very low temperatures (about 77 K) to achieve the highest possible performance. By increasing the operating temperature of the sensors above 100 K, smaller coolers can be used, which results in 50% reduction in both size, weight and power consumption (SWaP) of the detectors. IRnova has recently released a state-of-the-art SWaP detector, which has an operating temperature of 110 K, a detector size of 640x512 pixels and a pixel size of 15  $\mu\text{m}$ .

The next challenge is to develop a high-resolution detector, with 1280 x 1024 pixels and 10  $\mu\text{m}$  pixel size, while maintaining the high performance and low power consumption. To achieve this, a special detector design based on type-II superlattices (T2SL) is required, for which the performance is not affected by the reduction in pixel size. Within this project, such a detector design will be developed and evaluated. In addition, the precleaning process of the pixels will be modified to prevent an increase of surface leakage current with reduced pixel size.

This work will be performed in a joint project between IRnova and KTH, in which IRnova will develop the detector design, while KTH will contribute with expertise in surface treatments of small pixels. During the project, a reference group with camera manufacturers and end users will be formed which will be part of the following FoI Project. In the FoI project, high-resolution sensors will be developed with the best design and passivation identified in this study. IRnova is currently the only European manufacturer of T2SL detectors. By also mastering the high-resolution technology, the competitiveness of the company will increase significantly.

**Co-ordinator: IRnova**

**Other project partners: KTH**

**Total cost of project: 847 450 SEK**

**Total grant: 399 100 SEK**

Med stöd från