Polish Road to Infrared Photodetectors

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The development of infrared (IR) detectors in Poland was inspired by the pioneering work of Polish scientists on narrow-gap semiconductors physics, in particular mercury-cadmium telluride (HgCdTe). A comprehensive program of development and commercialization of detectors was created at the Military University of Technology and the Institute of Plasma Physics and Laser Microfusion in the 60th of the past century. Unique technologies of epitaxy of heterostructures of II-VI materials were developed for the middle (MWIR) and long-wavelength (LWIR) infrared detectors, such as photoconductive, photovoltaic, photoelectromagnetic, and magnetoconcentration effect devices.

Further development of the detectors and the launch of their production on a technical scale has been associated with the Vigo company, in a close cooperation with Polish universities and research institutes. The company specializes in infrared detectors operating at ambient temperature or cooled with thermoelectric coolers. The detectors are typically integrated with Peltier coolers, preamplifiers, optical elements other components in common demountable or sealed packages. The company's development was initially financed almost exclusively from the sale of its products. Up to 2003, the production of the detectors was based on a unique epitaxy system, developed and fabricated at Vigo in cooperation with scientists from Serbia. The production brought about our first $ 5M income.

Vigo's development has been significantly accelerated thanks to participation in EU projects and the heavy investment in advanced MOCVD and MBE epitaxy systems, chip processing, microelectronic assembly, packaging, and device characterization equipment. These investments resulted in the continuous development of the company and a steady increase in sales. Vigo products have been exported to almost all developed countries of the world. They found wide applications, including the spectacular ones, e.g. in NASA's Curiosity Mars Mission, devices used in the detection of gravitational waves, ultra-sensitive chemical analyzers, and many other application.

The present R&D efforts are on the devices based on the III-V materials, compliant with the RoHS directive. Short-, medium- and long-wavelength detectors based on III-V heterostructures made of the bulk and superlattice materials as well as modules with these detectors are already manufactured. Wafers with III-V structures for detectors, lasers, and microelectronics, became the new Vigo commercial products. Currently, we are developing more advanced detectors and related detection modules including one- and two-d arrays, cascade detectors, devices with enhanced absorption and many other products.

We associate Vigo's future with photonics which is reflected in the rebranding of the company name to Vigo Photonics. For this, we are going to implement integrated photonic devices with lasers, detectors, and other components in common packages.