



Special Section on Infrared Detectors

Infrared systems are a primary subject in *Optical Engineering* and an important technical community within SPIE. Applications range from monitoring and controlling manufacturing processes, to allowing firefighters to see through smoke, to monitoring building heat loss, to military nighttime operations. The two primary bands in infrared systems are the midwave band (MWIR: 3 to 5 μm) and the long-wave band (LWIR: 8 to 12 μm). Near infrared (NIR: 0.7 to 1.1 μm) and short-wave infrared (SWIR: 1.1 to 3.0 μm) are actually considered electro-optical systems, since the majority of light received by these systems from an object is reflected and not emitted. Infrared systems are comprised of many parts or components. To me, the heart of an infrared system is the infrared focal plane (the detector array), where the optics might be the lungs and the electronics might be the brains.

In this issue of *Optical Engineering*, we are pleased to include a special section in the area of infrared detectors. Our guest editors are Paul Norton and Mel Kruer, two of the world's most gifted scientists in the area of infrared detectors. Paul Norton is a senior staff consultant to Dr. Fenner Milton, the director of the U.S. Army Night Vision Laboratory. Mel Kruer is a Navy ST (scientist/technologist at the highest level in the Navy), a detector expert, and a pioneer in the area of persistent surveillance infrared focal planes. Both of these gentlemen are world-renowned in the area of infrared detectors, and I would like to thank them for guest editing this special section. For many years, the preeminent materials for mid- and long-wavelength infrared detector arrays have been indium antimonide (InSb) and mercury cadmium telluride (HgCdTe). InSb is the more economical choice for most

high-performance air- and ship-board MWIR sensor applications, while HgCdTe, whose response wavelength can be tuned by varying the material composition, is used for high-performance LWIR and two-color applications. The desire for more cost-effective, lightweight, and compact sensors, and advances in microfabrication techniques, enabled uncooled microbolometer arrays operating in the LWIR. Recent advances in engineered layered materials using epitaxial growth techniques opened the area of type-II superlattice and barrier-based detector technology using III-V compounds. These are thought to be better supported for high-volume production leading to lower costs. The detector papers provided in the special section cover the SWIR, MWIR, and LWIR bands. The technologies include uncooled, InGaAs, InSb, type-II superlattice, HgCdTe (or MCT), and quantum-well detectors.

Around 10 years ago, after I wrote my first book in the area of infrared systems, I taught a graduate course for George Mason University onsite at the Army Night Vision Laboratory. A friend of mine who was an infrared systems expert at the lab was taking the class. On the first day of class, he raised his hand and asked, "How does it feel to teach a course where the students know more about the subject than you do?" A little shaken, I replied that if he attended all the classes, completed all the homework, and did well on the tests, he might just earn an "A." We still laugh about that day.

Ronald G. Driggers
Editor