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Development of high-operating long wave HGCDTE devices at army research laboratory

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Mercury cadmium telluride (HgCdTe) alloy is of great importance in sensing radiation from the near infrared (λc ~ 1 μm) to the very long wavelength infrared (λc ~ 15 μm). Much of the HgCdTe-related research and development work is carried out for cooled operation. Intrinsic carriers play a dominant role, especially at long-wavelength (LW 8 μm to 12 μm cut-off) material near ambient temperatures due to high thermal generation of carriers. This results in low minority carrier lifetimes due to Auger recombination processes. Consequently, this low lifetime at high temperatures results in high dark currents and high noise. Cooling is one means of reducing this type of detector noise. The challenge is to design photon detectors to achieve background-limited performance (BLIP) at the highest possible operating temperature, with the greatest desire being operation close to ambient temperature. This paper present a path to achieve BLIP LW HgCdTe at twice the operating temperature of current 80K LW HgCdTe technology. High operating temperature LW devices would result in several advantages to an infrared imaging system. This technology will offer half the cool down time than the present technology for greater battle field survivability with faster first "image out" and less than half the power consumption (2 Watts vs 5 Watts). This will lead to dramatic reduction in size, weight and power resulting reduced cost (SWaP-C).

Biography

Priyalal Stephen Wijewarnasuriya received his Ph.D. in Physics from the University of Illinois at Chicago. He was a member of technical Staff at the Rockwell Scientific Center, CA and was dedicated to demonstration of novel, large-format infrared focal plane arrays for tactical and strategic military applications as well as for astronomy using HgCdTe alloy. He is currently leading the development of the next generation of infrared materials and devices at the U.S. Army Research Laboratory (ARL), Adelphi, MD. He is the Team Leader of "II-VI Materials and Devices Team". Dr. Wijewarnasuriya has authored or co-authored over 100 papers in the open technical literature, four book chapters and has presented his work at numerous national and international conferences. Currently, Dr. Wijewarnasuriya serves as a member of the organizing Committee for two international conferences in the infrared technology area.

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