HOT silicon carbide (SiC) wide band detector for MWIR/LWIR

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BIOGRAPHY

Principle Author Name: Dr. Tariq Manzur, NUWC: In 1988 Dr. Manzur received his Ph.D from University of Connecticut in the area of material Science and Engineering from Institute of Materials Science (IMS) and Engineering. Dr. Manzur holds three patents on fiber and fiber laser and detector technology. He has over twenty years hands-on experience in research, product development, technology transfer in the area of engineering of electro-optics, manufacturing of crystal laser, fiber laser, nanosecond fiber laser, EDFA, spatial and spectral beam coupling development of opto-electronic material and other photonics based technologies for industrial, telecommunications, scientific, medical and defense applications, imaging, EW and EO/laser devices etc. Dr. Manzur is a Fellow of Institute of Physics (IOP). He is also author and co-author of more than 10 refereed journal articles, two book chapters, 2 patents awarded and 3 applied/pending, and over 30 invited conference presentations.

TECHNICAL ABSTRACT

A novel approach will be discussed to design and fabricate sensors for a multiple wavelengths (MWIR/LWIR) by selecting appropriate acceptor levels in a semiconductor wide band gap material SiC. An n-type 4H-SiC substrate has been doped with gallium using a laser doping method for sensing the MWIR wavelength of 4.21 μm. The incident MWIR/LWIR photons change the electron densities in the valence band and the acceptor energy levels, modifying the reflectivity of the sensor. This change in the reflectivity is determined with a He-Ne laser/LED read out as an optical signal and the sensor can be operated at high temperature. The effect of the photon collection optics and optical readout on the sensor response has been studied. Also the dopant concentration has been found to affect the optical signal. These results will be presented at the MIOMD XI Conference. We will also present focal plane array (FPA) concept of using this innovative technology at MWIR/LWIR band.

Keywords: SiC, wideband, MWIR/LWIR, Optical readout