

3. Title: Terahertz detectors and focal plane arrays

Author: Rogalski, A; Sizov, F

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Abstract: Terahertz (THz) technology is one of emerging technologies that will change our life. A lot of attractive applications in security, medicine, biology, astronomy, and non-destructive materials testing have been demonstrated already. However, the realization of THz emitters and receivers is a challenge because the frequencies are too high for conventional electronics and the photon energies are too small for classical optics. As a result, THz radiation is resistant to the techniques commonly employed in these well established neighbouring bands.

In the paper, issues associated with the development and exploitation of THz radiation detectors and focal plane arrays are discussed. Historical impressive progress in THz detector sensitivity in a period of more than half century is analyzed. More attention is put on the basic physical phenomena and the recent progress in both direct and heterodyne detectors. After short description of general classification of THz detectors, more details concern Schottky barrier diodes, pair braking detectors, hot electron mixers and field-effect transistor detectors, where links between THz devices and modern technologies such as micromachining are underlined. Also, the operational conditions of THz detectors and their upper performance limits are reviewed. Finally, recent advances in novel nanoelectronic materials and technologies are described. It is expected that applications of nanoscale materials and devices will open the door for further performance improvement in THz detectors.