INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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Thesis Title:

Investigation on Terahertz Band and Graphene Based Antennas

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SHORT ABSTRACT

Inspite of research and developments in the Terahertz band of frequencies of the electromagnetic spectrum, this band has not been able to emerge as a favourable band for communication activities mainly due to unavailability of robust and inexpensive sources and detectors capable of working at Terahertz frequencies. Terahertz band is sandwiched between the optical and the microwave regions of the electromagnetic spectrum. One major technical issue is that the fundamental working principle of the devices working in the two bands around the Terahertz band are quite different. Therefore, the sources and detectors used in these two regions fail to perform when simply scaled to work in the Terahertz region. This fact necessitates development of such components whose working principle is suitable for the Terahertz frequencies. Various potentially important applications have been envisioned especially in the fields of medicine, security, defence and short-distance communication. Hence, a proper analysis and design procedure for efficient Terahertz sources and detectors is a need of the hour. The research reported in this thesis focuses on the various issues related to design of antenna systems, in the Terahertz band, which is an essential component of Terahertz band sources and detectors. The work presented in this thesis analyses in detail novel optoelectronic antenna systems which involve multiple physical phenomena in their operations. Graphene, in recent times, is emerging as an attractive material for various applications. This thesis also investigates application of Graphene in design of conventional as well as Terahertz band antennas.