Plasma Oscillations in 2DEG Nanometer Field Effect Transistors for Terahertz Detection

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Two-dimensional electron plasma in nanometre size field effect transistors can oscillate in Terahertz (THz) frequencies, far beyond transistors fundamental cut-of frequencies [1]. We present an overview of some important and recent results concerning the physics of nanometre scale field effect transistors showing that they can be used for the detection of terahertz radiation

The subjects were selected in a way to stress some new aspects/developments rather than purely technological/engineering improvements. The basic physics related problems like temperature dependence of the photoresponse [2], interferences of THz signals leading to helicity sensitive detection are presented [3].

Until now most of works on nanometer FETs detectors were considering only THz imaging applications. We show the progress in overcoming the loading problems and demonstrate first results on the application of nanometre FETs as detectors in wireless communication with signal modulated in GHz range[4]. Finally we present also results from THz detection by grapheme transistors[5]. A possible development of future THz detectors using grapheme structures is also addressed.

References

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