

Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Response of Plasmonic Terahertz Detectors to Modulated Signals SERGEY RUDIN, GREG RUPPER, MEREDITH REED, U.S. Army Research Laboratory, MICHAEL SHUR, Rensselaer Polytechnic Institute — We present theoretical study of the response of two-dimensional gated electron gas to an amplitude modulated signals with carrier frequency in the terahertz range. Our model is based on complete hydrodynamic equations, and includes effects of viscosity, pressure gradients and thermal transport in the conduction channel of a high electron mobility semiconductor transistor. The modulation response was evaluated as a function of modulation frequency for a range of mobility values in different semiconductor materials. Maximum modulation frequency was evaluated as a function of channel mobility, with typical values in the subterahertz range of frequencies. Our analysis shows that short channel field effect transistors operating in the plasmonic regime meets the requirements for applications as terahertz detectors and modulators in high-speed wireless communication circuits.

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Date submitted: 24 Nov 2015

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