Seminario

2D-electronic materials for THz technologies: From basic physical properties to market applications

Dr. Amine El Moutaouakil

Assistant Professor
Department of Electrical Engineering, College of Engineering,
United Arab Emirates University

Abstract

Since 1990's, high-electron-mobility transistors (HEMT's) have exhibited outstanding high-speed performances, but their breakdown properties were degraded due to the aggressive scaling of their feature size, namely their gate length. Improving the breakdown was always accompanied by a degradation in speed performance. Researchers are trying to cope with such degradations by introducing advanced and nano-scaled material configurations in the channel of HEMTs, by inserting advanced quantum well, which exhibit record high-speed performances because of their high electron mobility and saturation velocity, or by using optimized Silicon δ-doping layers in the epitaxial structures, which provide a high-speed operation for short-LG HEMTs. The combination of all these advances opened the path for HEMTs to provide several applications in the higher frequencies such as the Terahertz (THz) gap. In this presentation, we show the results of those combinations obtained for HEMTs based on III-V compound semiconductor, and we will have a look at what makes these optimized HEMTs a great candidate to take over Silicon-based transistors, and how they differ from other emerging technologies.

Biography

Dr. Amine El Moutaouakil received the engineering degree in electromechanical engineering from the Ecole des Mines, Morocco in 2005, and he completed his M. E and PhD from Tohoku University, Japan in 2008 and 2011 respectively. He was a Postdoctoral fellow at Tohoku University before joining Nippon Telegraph and Telephone Corporation (NTT), Japan, as a research staff member, where he conducted research on HEMTs based on InP and related materials. Since 2017, he has been with the UAE University as a faculty. His current research interests include the design, fabrication, and characterization of electron devices for ultrahigh frequencies including terahertz.

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