Short bio

Max C. Lemme is Professor in the Faculty of Electrical Engineering and Information Technology at RWTH Aachen University, where he holds the Chair of Electronic Devices. He is also Director of AMO GmbH in Aachen, Germany, a nanotechnology SME focusing on technology transfer of R&D results. The main focus of his group is the investigation of electronic, optoelectronic and nanoelectromechanical devices made from silicon, graphene and 2D materials, with a strong emphasis on applications. From 2012-2017 he was Heisenberg Professor for Graphene-based Nanotechnology at the University of Siegen, Germany. From 2010-2013 he was Guest Professor at KTH Royal Institute of Technology, Sweden and from 2008-2010 he was a research fellow at Harvard University, USA. From 1998-2008 he worked at nanotechnology start-up AMO GmbH, Germany, as Head of Technology Department. He coordinated several European Projects on graphene devices (GRADE, GRAND). He received an ERC grant for Integrating Graphene Devices (InteGraDe) in 2012 and a "NanoFutur" award of the German Ministry for Education and Research in 2006. He is Senior Member of IEEE.

Abstract

Sensors and Sensor Systems based on 2D Materials

Two-Dimensional (2D) materials like graphene are by definition very sensitive to the environment, as they consist almost entirely of surface. As a consequence, the presence of single charged molecules on a device surface can be detected in a laboratory environment. [1] However, in real life applications, many parameters influence device behavior, and these parasitic effects have to be considered. The talk will discuss gas sensing applications based on large are, chemical vapor deposited graphene, and some of the aspects of specificity and cross sensitivity. [2,3] In addition, I will introduce $PtSe_2$ as an extremely sensitive gas sensing material, that may also be used as an effective strain sensor. [4,5] Finally, I will address challenges and opportunities of sensor device and circuit integration of 2D materials. [6–8]

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