CENIDE & WIN Seminar Series on 2D-MATURE

DFG IRTG 2803 & NSERC CREATE

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"2D Materials for future applications: Photonics, Sensors and RF circuits"

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Daniel Neumaier received the PhD degree in 2009 from the University of Regensburg, where his research focused on quantum transport in low-dimensional semiconductors. Afterwards, he became head of the Graphene-Group at AMO GmbH, a research centre located in Aachen. Since 2020 he is Full Professor for Electrical Engineering at the University of Wuppertal, heading the chair of smart sensor systems, and Scientific Advisor at AMO GmbH.

Graphene and related two-dimensional materials like MoS2 or WSe2 have emerged some 15 years ago as promising options for electronic, photonic and sensor devices. Possible applications in these fields include solutions for continuing the down-scaling of logic devices (Moore's law), high frequency electronic circuits, ultrafast optoelectronics for optical communication and flexible electronics. In this talk I will give an overview on the field in these areas, focusing on recent results on visible and infrared photodetectors, THz detectors and integrated RF circuits based on graphene.
One key requirement for a commercial success of these devices is large volume production, i.e. wafer-scale processing, which needs to be developed and mastered. While wafer scale growth of graphene and related 2D materials has been demonstrated by means of chemical vapor deposition or similar methods, the yield and reproducibility of final devices still does not meet application requirements. I will give an overview on the current status for wafer-scale production and outline the key challenges.