2D-material based photodetectors for mid-IR sensing

Stephan Suckow[†]
Shayan Parhizkar[†,‡], Anna Lena Giesecke[†], Sebastian Lukas[‡], Nour Negm[†,‡], Max C. Lemme[†,‡]
[†]*AMO GmbH, Otto-Blumenthal-Str. 25, 52074 Aachen, Germany*
[‡]*Chair of Electronic Dev., RWTH Aachen University, Otto-Blumenthal-Str. 25, 52074Aachen, Germany*
Daniel Schall
Black Semiconductor GmbH, Schloss-Rahe-Strasse 15, 52072 Aachen
Maximilian Prechtl, Oliver Hartwig, Georg S. Duesberg,
Institute of Physics, EIT 2, Faculty of Electrical Engineering and Information Technology, University of the Bundeswehr Munich & SENS Research Center, Werner-Heisenberg-Weg 39, 85577 Neubiberg, Germany
Sophia Wahl, Matthias Wuttig,
Institute of Physics IA, RWTH Aachen University, 52074 Aachen, Germany
Arne Quellmalz, Kristinn Gylfason
KTH Royal Institute of Technology, Malvinas väg 10, Stockholm, Sweden
suckow@amo.de

Abstract
Optical spectroscopy is among the most important chemical analysis techniques, due to its high specificity and long-term stability. For spectroscopic analysis of gas compositions, the mid infrared (mid-IR) region is particularly important, owing to the rovibrational resonances in that spectral range. In our European projects ULISSES and AEOLUS we are working on the miniaturization of such gas sensors. One of their key components are mid-IR photodetectors (PDs) suitable for on-chip integration. Starting from our pioneering work on graphene PDs [1,2] we discuss evolving these devices into mid-IR PDs, leading to $PtSe_2$ based PDs where the active material can be grown directly on the waveguide [3,4].
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References

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Figures

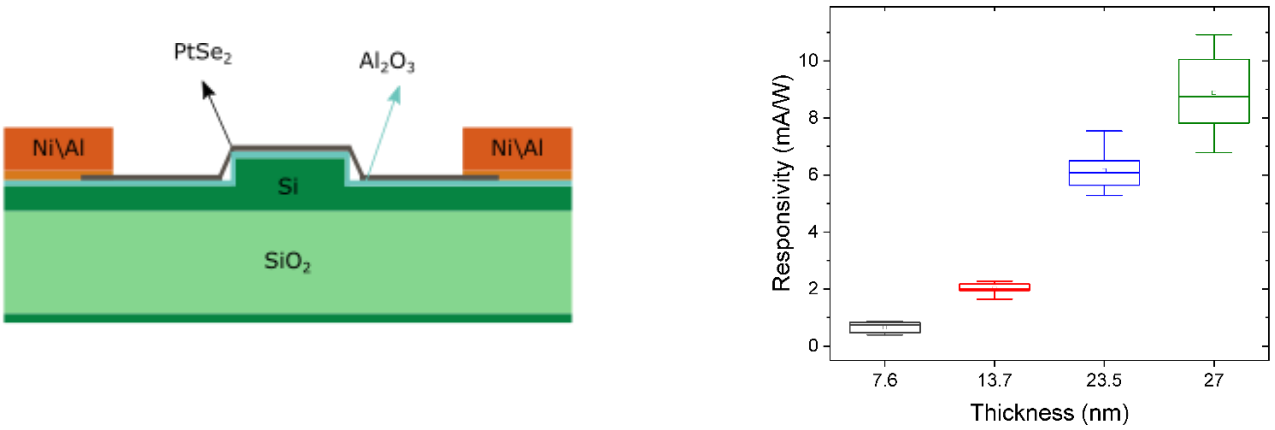

Figure 1: (left) Schematic cross section of mid-IR PDs based on the 2D material $PtSe_2$ and silicon waveguides [3]. (right) Box plot of photodetector responsivities for different thicknesses of $PtSe_2$ photodetectors measured at 4.5 V applied bias and 1550 nm wavelength [3].