

NanoGraM - Graphene Fabrication, Integration and Metrology for Nanoelectromechanical Systems

This project is a cooperation of the group of Graphene-based Nanotechnology, Department of Electrical Engineering and Computer Science, University of Siegen and four industrial partners (Infineon Technologies AG, WITec GmbH and Spanish SMEs Graphenea and SIMUNE). The goal of the project is to explore new Nano-/Microelectromechanical (NEMS/MEMS) devices based on graphene. NanoGraM will focus on three device concepts for potential future applications: graphene-membrane pressure sensors, graphene microphones and graphene-membrane Hall sensors. Such devices may find applications in widespread areas like smart phones, laptops, the Internet of Things, automotive, industry 4.0, homeland security or smart homes. The University of Siegen focuses mainly on graphene based pressure sensors. Here graphene covers cavities to keep a constant environmental pressure in the cavities. A change in outside pressure deflects the graphene membrane. Due to the piezoresistive effect graphene exhibits resistance changes, which can be measured electrically. The expected benefits of using graphene over conventional sensor materials are increased normalized sensitivity (up to factor 100), robustness (up to factor 5), reduction of size, enhanced signal-to-noise

ratios and the avoidance of hazardous materials in processing. The research activities in NanoGraM will provide a decisive technology lead for the industrial NEMS manufacturer and the participating small and medium enterprises. The project is funded through the German BMBF in the framework of an M-ERANET consortium.

I Project Management and Execution

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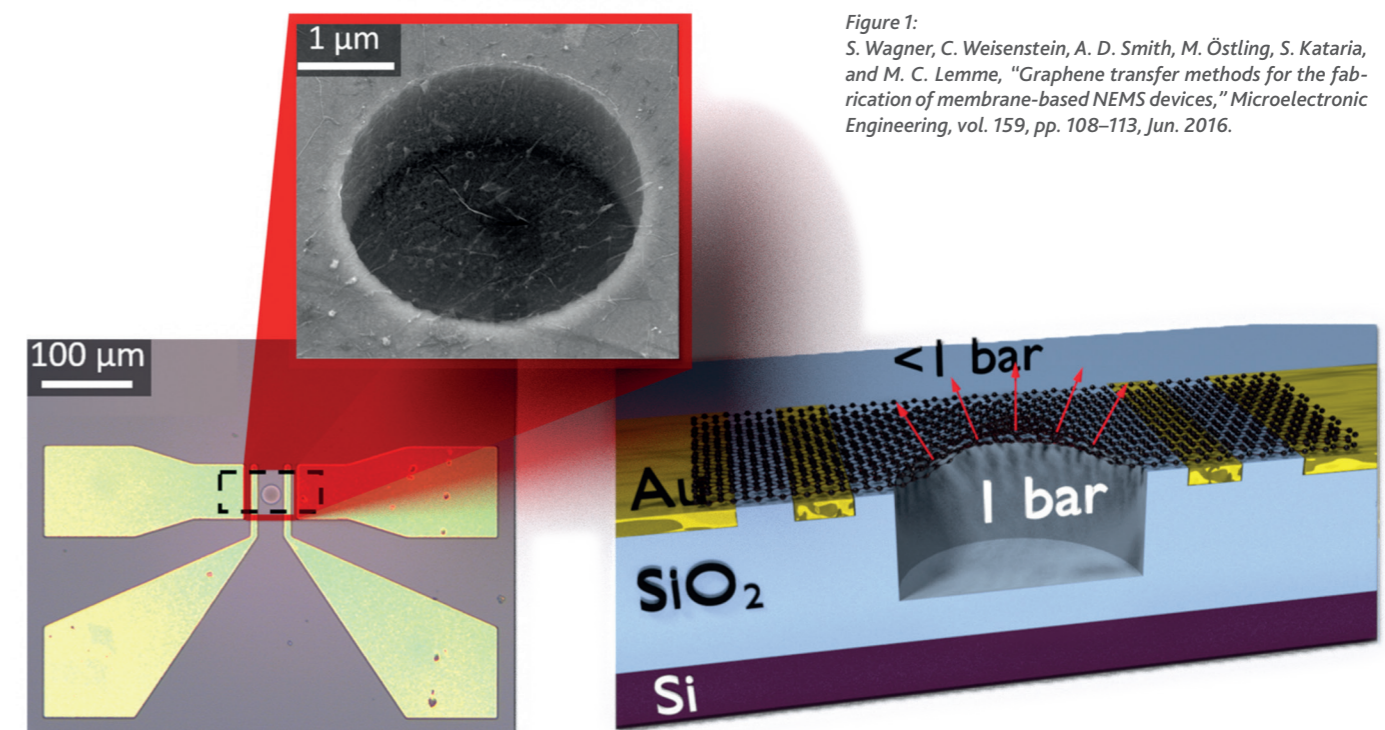


Figure 1:
S. Wagner, C. Weisenstein, A. D. Smith, M. Östling, S. Kataria, and M. C. Lemme, "Graphene transfer methods for the fabrication of membrane-based NEMS devices," *Microelectronic Engineering*, vol. 159, pp. 108–113, Jun. 2016.