Graphene Device and Process Integration – Opportunities and Challenges

Max C. Lemme

University of Siegen, Hölderlinstr. 3, 57076 Siegen, Germany

max.lemme@uni-siegen.de

Graphene Device and Process Integration - Challenges ahead!

Graphene research has matured from fundamental investigations of material properties to very specific demonstrations of devices and their potential for applications. In this talk, I will present several promising areas, where the exceptional properties of graphene may be exploited. Two examples are graphene-based hot electron transistors [1], [2] and graphene-membrane-based nanoelectromechanical systems [3], [4]. However, proper device and process integration remains challenging and currently prevents commercialization. Several open issues such as contamination, graphene transfer and electrical contacts will be discussed in detail [5], [6] [7].

References

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[3]   A. D. Smith *et al.*, ACS Nano, 10 (2016) 3237–3242

[4]   S. Wagner *et al.*, Nano Lett., 17 (2015)

[5]   G. Lupina *et al.*, ACS Nano, 9 (2015) 4776–4785

[6]   S. Wagner *et al.*, Microelectron. Eng., 159 (2016) 108–113

[7]   A. Gahoi *et al.*, Solid State Electronics, 125 (2016), 234-239
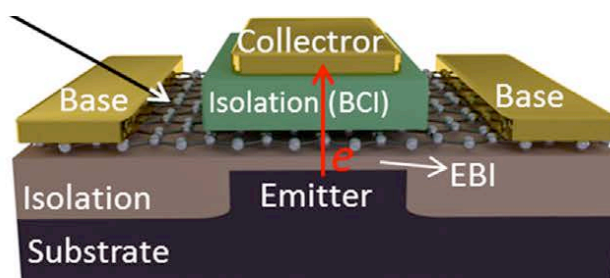
Figures

Figure 1: Schematic of a graphene-based hot electron transistor. The red arrow indicates the direction of electron transport, perpendicular to the graphene layer(s).
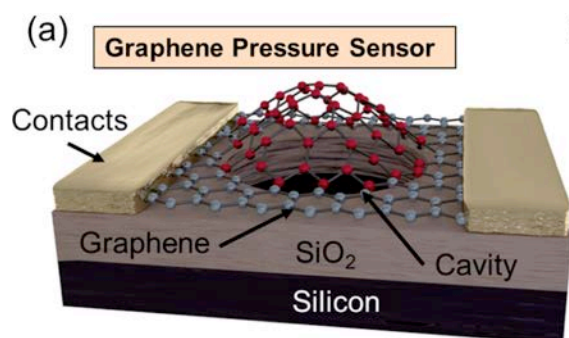

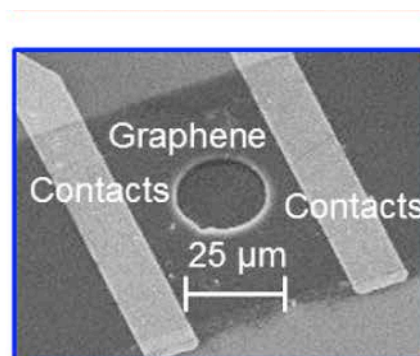**Figure 2:** Schematic of a graphene-membrane-based pressure sensor.

Figure 3: Scanning electron micrograph of a graphene-membrane-based pressure sensor.