

Manufacturing of graphene based electronic and sensor devices on wafer scale: Recent progress and remaining challenges

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Graphene based electronic, photonic and sensor devices have attracted significant interests because of their outstanding properties. However, for commercializing these devices, large volume production, i.e. wafer-scale processing, 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 transfer of such grown 2D layers to target substrates still faces severe challenges related to contamination, mechanical stress and reproducibility. In addition, defining and controlling quality, yield and reproducibility of (opto-)electronic devices is at a very early stage.

In this presentation I will discuss approaches, challenges and possible solutions for the wafer scale integration of graphene based electronic and photonic devices. The performance of such devices will be compared to chip scale production and the current limitations for yield, device to device variation and reproducibility will be discussed.

REFERENCES

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- [2] D. Neumaier, S. Pindl and M. Lemme Integrating Graphene into Semiconductor Fabrication Lines. Nature Materials 18, 525–529 (2019).

FIGURES

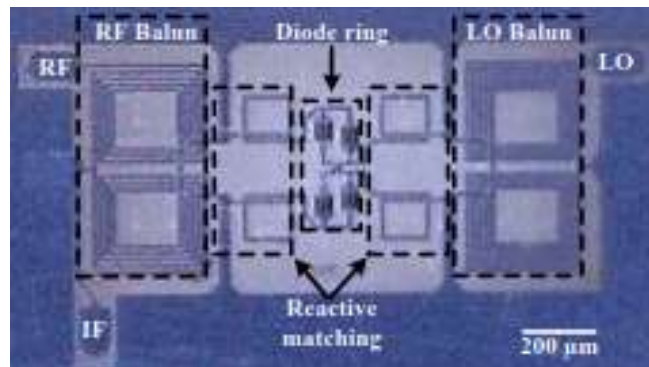


Figure 1: Optical micrograph of an integrated RF circuit (double balanced mixer operating at 6-12 GHz). The different parts of the circuit are indicated.

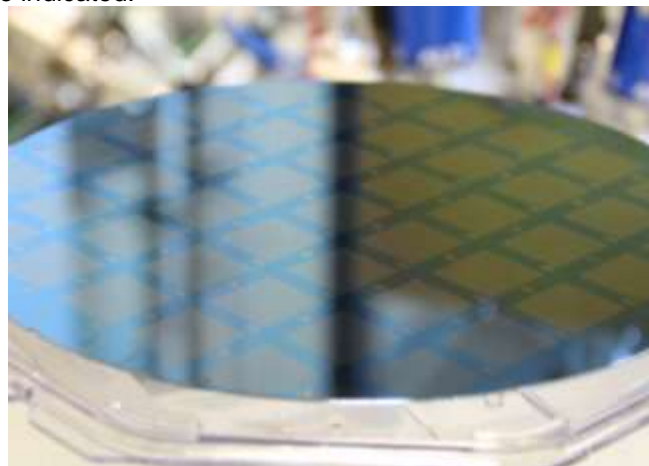


Figure 2: 8 inch wafer containing graphene based devices.