Wafer-scale growth of epitaxial graphene on SiC

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Graphene is on the verge of triggering a technological breakthrough. Recent advances in electronics harness its physical properties combined with existing technology. Therefore, devices showing high performance such as IR cameras [1], biosensors [2], UV photodetectors [3] and gas sensors [4] have been developed using graphene. Within this framework, wafer-scale production of graphene will play a key role to overcome the gap between proofs of concept developed at lab and mass-produced, standardized products Sublimation of silicon carbide (SiC) is a reliable route for wafer-scale integration of graphene-based electronics. Epitaxial graphene (EG) synthesis method on SiC wafers is CMOS compatible and takes advantage of the catalyst- and transfer-free growth of high-quality graphene. Yet, graphene on SiC can also be transferred onto other substrates if required [5].

Due to the intrinsic properties- i. e. wide bandgap, high-breakdown electric field, good thermal conductivity and high saturated electron drift velocity-, SiC is an ideal platform to develop wide band gap power devices [6]. Consequently major efforts have been performed in order to improve quality and increase the size of wafers during last years. In parallel, these technological advances have opened new avenues for the large-scale fabrication of EG devices, i. e. transistors with ~100 GHz cut-off frequency values fabricated on 2-inch SiC wafers [7].

In this contribution, we will report our progress on the synthesis of epitaxial graphene grown on SiC commercial wafers. Particularly, full coverage of 4-inch SiC wafers with graphene has been recently achieved (Fig 1 (a)). High quality of obtained graphene has been confirmed by Raman spectroscopy measurements, performed over the whole 4-inch SiC wafer (see Fig. 1 (b)).

References

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Figures

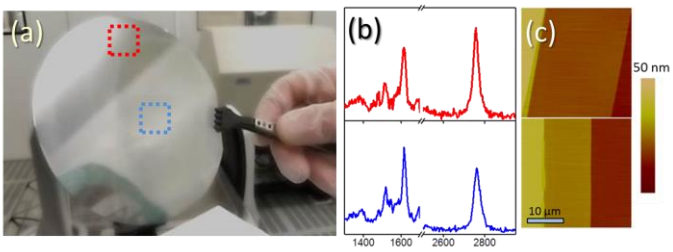

Figure 1: (a) Picture of a 4-inch SiC wafer covered with graphene. (b) Raman spectra of red (top) and blue (bottom) marked regions and (c) respectively topography signal AFM images.