

2D-Experimental Pilot line: progress in 2D-materials integration in industry relevant environment.

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A decade ago, the kick-off was given to the Graphene flagship initiative [1] by the European Union which enabled the exploration of a broad application zone for graphene and related materials. In time, based upon the many success-stories, the wording started to shift from “intriguing science” to “unique applications”. Among those fields: sensors, photonics, spintronics and electronics [2-3] are named. While each of these applications, require specific material and process requirements, many commonalities are found as well. In October 2020, the 2D-Experimental Pilot Line project has been launched with the aim to establishing an ecosystem for integrated 2D materials in the semiconductor industry [4]. In this project, tool manufactures, chemical and material providers and research institutes join forces to provide for new capabilities and prototyping offerings to universities, SME and companies.

A key challenge addressed, to obtain high performance active layers, is the deposition process which consists of the combination of a 2D-material growth and (semi)-automated transfer process [5]. Moreover, the combination of interface control and careful process selection is key for outstanding device performance and wafer-uniformity [6]. Further highlights of pathfinding activities in enabling process transfer from lab to fab [7] will be addressed in this presentation.

References

[1] <https://graphene-flagship.eu/>

[2] Lemme et al., Nat Commun (2022). <https://doi.org/10.1038/s41467-022-29001-4>

[3] Yang, H., Roche et al., Nature (2022). <https://doi.org/10.1038/s41586-022-04768-0>

[4] <https://graphene-flagship.eu/innovation/pilot-line/>

[5] Brems et al. (2023) VLSI TSA, T8-5.

[6] Smets et al. (2022) SSDM International Conference on Solid State Devices and Materials

[7] Ghosh et al, (2023) VLSI Technology and circuits; and Kundu et al, (2023) VLSI Technology and circuits

