Technologies and advanced characterization of stabilized two-dimensional materials-based platforms

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To integrate 2D materials in systems with high technology-readiness level, they must be reliable and efficient. However, evaluation and integration of those materials into discrete components requires a stabilization of their properties. As such, achieving replicable and reusable processes is highly desirable. In this presentation, fabrication processes of elementary discrete components based on 2D materials are presented with the objective of having stabilized electrical properties. To this end, the evaluation of a large-scale compatible fabrication/passivation process is done based on the encapsulation of large-area MoS2 monolayers [1] or large-scale CVD graphene [2]. The fabricated devices are characterized through Raman Spectroscopy, photoluminescence and Hall Effect. Finally, in addition to preliminary results on black phosphorus, a non-exhaustive overview of our advanced technologies and characterizations will be presented.

References

[1] Brus *et al.* Advanced Electronic Materials, 7, 2001109
[2] Mzali *et al.* Applied Physics Letters 109, 253100 (2016)

Figures

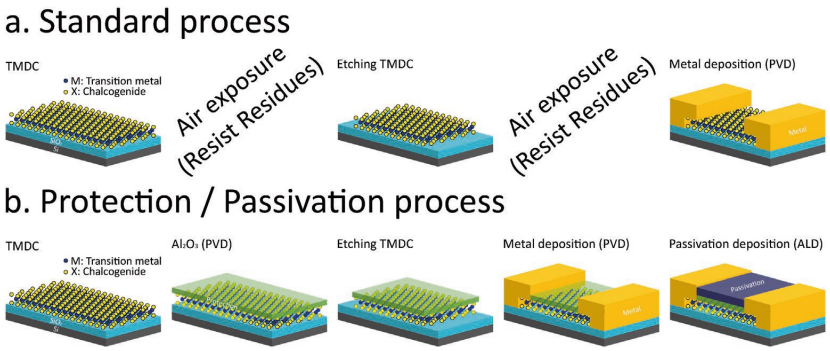

Figure 1. a) Standard process compared to b) protection/passivation process used for our device fabrication: the use of Al2O3 layers before and after fabrication allows to preserve the transport characteristics of the 2D semiconductor. From [1].