

## Requirements for graphene-based devices

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Graphene and other 2D materials have attracted a huge interest from the research community due to their extraordinary properties. It is expected that these properties will be translated into industrial applications in the future. However, at present graphene is at a research stage and many technological challenges have been identified before graphene can become a commercial success. The integration of graphene into the semiconductor industry is one of these challenges and device fabrication is one of the most critical parts. In addition, the surrounding environment<sup>1</sup> such as the substrate, surface adsorbates and the atmosphere (air composition, humidity, etc.) have a large impact on the graphene. Therefore, most probably encapsulation might be required for the final product. The performance of graphene field effect devices (GFETs) was found to improve considerably using aluminum oxide as encapsulating layer on top of the graphene.<sup>2</sup> The GFETs had a very low hysteresis and much lower doping levels. In addition, a passivated graphene channel was integrated into a coplanar waveguide to make an optoelectronic mixer for radar and radio-communication systems.<sup>3</sup> The passivation of graphene devices was also demonstrated on a scale of 100mm where 500 GFETs were tested.<sup>4</sup>

Alternatively, a non-contact characterisation method would be ideal to electrically characterize the graphene material,<sup>5</sup> specially as a non-destructive quality control method for graphene.

### References

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