From labs to pilot lines: Graphene and related materials device fabrication solutions

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Abstract

Extensive efforts in the research and development of graphene-based technologies over the last 15 years has resulted in steady increase in technology readiness. Today, we see an emergence in efforts for development of graphene-based applications (such as modulators, detectors, gas and biosensors) at scale. For successful scaling up of prototypical applications demonstrated to date, robust technologies, and processes for large area device fabrication are required.

Traditionally, plasma-based processing has been thought of as too harsh to achieve high-quality graphene devices, as any ion/radical interaction with the graphene surface can result in physical damage to the 2-D hexagonal structure. In contrast pure thermal deposition of dielectrics suffer from lower film quality and slower processing times. In this work, we show that remote plasma techniques enable the deposition of conformal and high-quality thin layers of Al2O3 on a heterostructure of single layer graphene and hBN, with negligible damage, as evidenced by Raman spectroscopy, breakdown voltages and ellipsometry mapping. Furthermore, utilising plasma enhanced techniques broadens graphene applications to thermally sensitive substrates/devices expanding the range of potential applications for graphene based electrical devices.

In this talk I will first give an overview of lab & fab technologies developed at Oxford Instruments towards growth of Graphene, other layered materials and heterostructures by CVD and ALD followed by our developments in technology for device fabrication processes such as dielectric deposition by ALD and device pattern etching by RIE and ALE

References

[1] Authors, Journal, Issue (Year) page (Century Gothic 11) Indicate references with sequential numbers within [square brackets].
[2] Authors, Journal, Issue (Year) page
[3] Authors, Journal, Issue (Year) page
[4] Authors, Journal, Issue (Year) page

Figures

Figure 1: Insert caption to place caption below figure (Century Gothic 10)

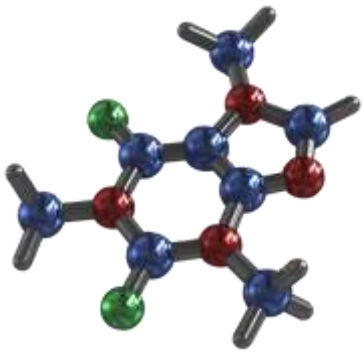

Figure 2: Insert caption to place caption below figure (Century Gothic 109