Graphene in Sensors

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Abstract

Graphene being a monolayer of carbon atoms exhibits some remarkable electronic and mechanical properties that make it an ideal candidate to be applied in various types of sensors. The sensors' market is extremely large since we are dealing with the automotive, electronics and healthcare industries among others. Therefore, it is an excellent starting platform for graphene applications. For example, the current COVID-19 pandemic has demonstrated the urgent need for fast diagnostics in order to minimise and control its effects, here, biosensors based on graphene field effect transistors (GFETs) have shown great potential as a platform for future diagnostics, Figure 1. Since graphene has unique properties such as high carrier mobilities and electrical conductivity, flexibility, biocompatibility, facile chemical functionalisation, and large specific surface area, allowing the immobilisation of high density of bioreceptors, leading to increased sensitivity.

During this talk, I will cover the use of graphene in various types of sensors including MEMS [1,2] ion sensors (ISFETs) [3-5], gas sensors [6] and biosensors. Depending on the type of sensor, the graphene requirements including the transfer and characterisation vary considerably.

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FIGURES

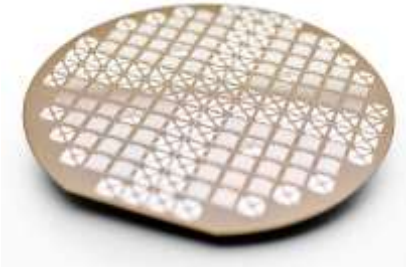

Figure 1: Graphene field effect transistors (GFETs) at wafer scale.