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A Different Twist on Solid -Source Epitaxial Graphene and its Benefits for Integrated Technologies

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Semiconductor technologies are the basis of most miniaturized systems available to us, whether in the form of microprocessors, micro /nano -sensors, miniaturised cameras and acoustic systems, etc. Such systems are made of integrated circuits and nanoscale components built in parallel on a semiconductor substrate, following a sequence of hundreds of thin -film based processes. The continued progress of semiconductor technologies is heavily reliant on the continued innovation in electronic (nano)materials and their successful integration into novel and reliable devices on silicon, which can be fabricated consistently at the wafer –scale.

Graphene has been the first material in the now large 2D family to be discovered, and holds vast promise for integrated technologies. However, despite the interest, its introduction in semiconductor technologies is still lagging behind. We will review some of the specific challenges that graphene has encountered in terms of semiconductor applications, with particular focus on the need for direct and up scalable synthesis and reliability. Taking into account such constrains, we have devised a unique approach to obtain graphene on silicon substrates over large areas and in a site –selective fashion. We will review our progress and current understanding of this new technology, and indicate some of the most promising application areas.