ABSTRACT:

An Epitaxial Graphene on Silicon Platform for Miniaturized Devices

Prof.Francesca Iacopi*

University of Technology Sydney, Faculty of Engineering and IT
Centre of Excellence in Transformative Meta-Optical Systems (TMOS)
Centre of Excellence in Low-Energy Electronics Technologies (FLEET)

Over the last several years, the scientific community has focused a lot of effort in attempting to translate the successful thermal decomposition route of bulk SiC [1] into a parallel approach for epitaxial graphene (EG) using 3C-SiC on silicon [2, 3]. However, this route has proven substantially more challenging, due to the highly defective hetero-epitaxial SiC surface, and additional reliability issues [4]. Therefore, a large –scale electrical evaluation of the transport properties of EG on 3C-SiC on silicon had been elusive so far, and epitaxial graphene on SiC on silicon had not yet found suitable applications.
We have overcome those limitations using a liquid –phase, solid source epitaxy approach to achieve larger –scale and consistent graphene coverage even on a highly -defective 3C-SiC surface [5]. We demonstrate we can achieve similar conductivities as for EG on bulk SiC, ie close to the quantum limit, despite substantially smaller grain sizes [6].
Promising applications range from high-frequency electronics [7] to integrated MIR functionalities [8] and biosensing, in particular, neural sensors [9].

References:
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