

TUESDAY, AUG. 28, 2018

1:00 PM, 260 DREESE LABORATORIES

Prof. Francesca Iacopi

School of Electrical and Data Engineering
University of Technology Sydney



Graphene on silicon carbide: a versatile material system for integrated photonics and energy storage

Abstract: Graphene is a promising but challenging material to be harnessed for wafer-level micro and nanodevices. We have pioneered a methodology to obtain large -scale graphene from silicon carbide on silicon substrates in a transfer -free and site -selective fashion [1, 2], with particularly promising application for integrated nanophotonics and energy storage systems [3]. In fact, the combination of graphene and silicon carbide on silicon is ideal, for multiple reasons. First, the use of a silicon substrate enables easy microfabrication and compatibility with silicon technologies. Second, the silicon carbide on silicon not only allows for a templated, solid source and site-selective synthesis of graphene, but also greatly improved adhesion of graphene to the substrate. Third, the silicon carbide underneath the graphene offers a range of benefits that go beyond the simple structural and mechanical support for the 2D material, to active functional roles such as the exploitation of its photonics properties, i.e. tuning of its surface phonon-polariton [4] and subsequent coupling with graphene plasmonics.

[1] B.V.Cunning, M.Ahmed, N.Mishra, A.R.Kermany, B.Wood, F.Iacopi, *Nanotechnology* 25, 325301, 2014.

[2] N.Mishra, J.J. Boeckl, A.Tadich, R.T. Jones, P.J.Pigram, M.Edmonds, M.S. Fuhrer, B.M. Nichols, and F.Iacopi, *J. Phys. D: Appl. Phys.* 50, 095302, 2017.

[3] M.Ahmed, B.Wang, B.Gupta, J.J.Boeckl, N.Motta, F.Iacopi, *Journal of The Electrochemical Society*, 164 (4) A638-A644, 2017.

[4] J.Caldwell et al, *Nano Lett.* 13, 8, 3690-3697, 2013.

Bio: Prof. Francesca Iacopi (PhD KULeuven, 2004) has 20 years' industrial and academic expertise in Materials and Devices for Semiconductor Technologies, with over 120 peer-reviewed publications and 9 granted patents. Her research emphasis is on the translation of basic scientific advances in nanomaterials and novel device concepts into industrial processes. Research Scientist at IMEC (Belgium) over 1999-2009, she then took up a one-year Guest Professorship at the University of Tokyo (Japan). In 2010-2011 she directed the Chip-Package Interaction strategy for GLOBALFOUNDRIES (Ca, USA), before becoming full-time Academic in Australia in 2012, where she invented a process to obtain graphene on silicon wafers, with applications in integrated sensing and energy storage. She was recipient of an MRS Gold Graduate Student Award (2003), an ARC Future Fellowship (2012), and a Global Innovation Award in Washington DC (2014). She is currently Head of Discipline, Communications and Electronics, in the Faculty of Engineering and IT of the University of Technology Sydney.

Hosted by: Paul R. Berger