Graphene Technology: synthesis, characterization and technological device integration

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Graphene fascinating properties hold promises for a great technological impact [1]. Nevertheless, to allow for a real exploiting of their extraordinary properties, a complete control of the fabrication steps of graphene-based devices is mandatory. In this contribution we will show an integrated approach for the integration of graphene membranes in state-of-the-art technological processes and for the exploitation of their properties in an applicative framework.

Our approach starts from the careful control of the synthesis parameters of the CVD growth of graphene membranes, as well as of their structural and functional properties. It moves then to the definition of tailored transfer processes leading to the integration of graphene membranes in a wide class of functional substrates (technological surfaces, glass, plastic and polymeric flexible substrates), as well as of their surface functionalization, to provide the control of physical and chemical properties over large area, typically mandatory in the devices fabrication processes. [2-5]. Final step is the definition of the complete set of technological processing steps needed to achieve a full integrability of the membranes within the processes of fabrication of micromachined devices.

Examples concerning design and fabrication of micromachined sensing device or concerning the integration of graphene membranes as transparent conductive electrodes in thin film solar cells or in light emitting devices will be provided [6-8].

References

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Figures

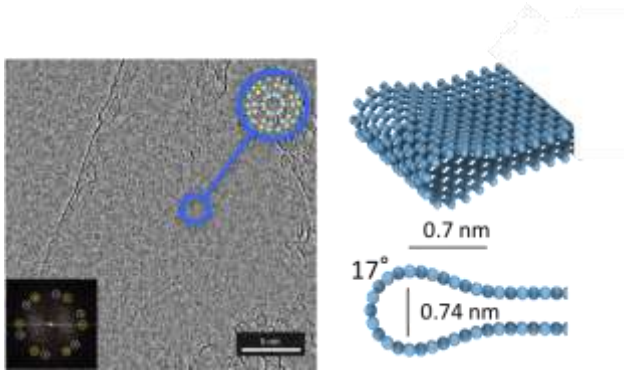

Figure 1. CVD grown graphene membrane 3D/strain reconstruction with sub-nanometric lateral resolution

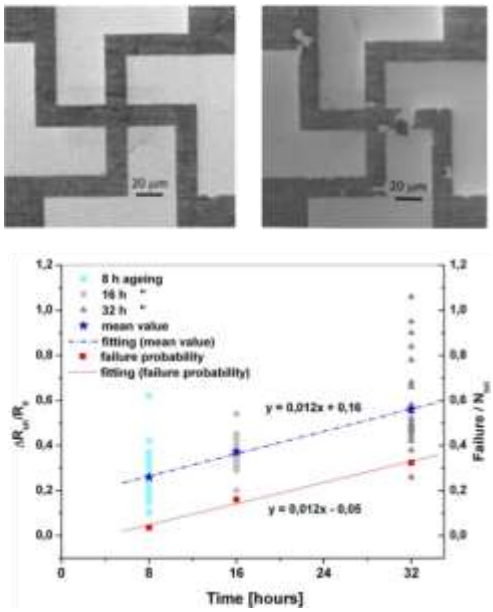

Figure 2. Reliability-driven graphene integration in Si Technology