Growth and fabrication of devices based on carbon nanotubes and graphene for sensor applications

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Single-wall carbon nanotubes (SWCNTs) were grown on silicon substrates by thermal chemical vapour deposition (CVD). Iron (Fe) was chosen as the catalyst metal to promote CNT growth. Two different configurations were used to obtain a high yield of SWCNT. Firstly, Fe thin film (~ 1 nm) is deposited directly on the SiO2/Si substrate. Secondly, the same Fe film is deposited on Al(10nm)/SiO_2/Si substrate. Graphene and few-layer graphene samples were prepared using different methods: 1) Standard exfoliated procedure was performed using semiconductor grade tape and then characterized using a combination of optical microscopy, atomic force microscopy (AFM) and Raman spectroscopy. To remove tape residue, the graphene samples were heated in a quartz tube at 500°C for 15min under Ar:H_2 flow (850:150 sccm). 2) Epitaxial graphene was grown using a home made directed current furnace (500 sccm Ar – 1800 ^{o}C) using different orientations of SiC substrates. 3) 'CVD graphene' was also prepared using a CVD furnace and a Ni foil as catalysts. Back gated field effect transistor devices based on isolated carbon nanotubes and graphene were prepared by standard photo-lithography and evaporation techniques. Initial results showing the response of the devices exposed to different gases and biomolecules will be presented.