Graphene Oxide: from fundamentals to applications.

Luca Ottaviano
Dipartimento di Scienze Fisiche e Chimiche Università dell'Aquila, L'Aquila, I67100, Italy

In this paper we survey our recent efforts aimed to a fundamental understanding of the physical/chemical properties of Graphene Oxide (GO) alongside with its investigations as a gas sensing materials, and a nano-bio study focused on its cito and geno-toxic effects.
From the fundamental point of view, GO has been studied as a function of its reduction degree with XPS, micro-Raman, Optical-Microscopy, Contact Angle Microscopy, and with Synchrotron Radiation, core level, valence band, and (C1s and O1s edges) X ray Absorption experiments. From such studies, handy and easy-to-measure parameters like the GO optical contrast or Contact Angle are proposed to quantitatively determine the oxidation degree of GO and its surface area ratio occupied by pure graphene areas. Besides, we determined both with X-ray Interference Lithography and also with EUV Synchrotron Radiation Studies the effects of GO photo-reduction [1]. For the gas sensing applications [2] we report a study of the electrical response to NO_2, CO, H_2O and H_2 of a graphene oxide (GO) based gas sensor. The observed gas sensing performance of the GO based sensor is similar to the best one reported in literature for carbon nanotubes. The nano-toxicology issues related to a potential widespread use of this material will be also discussed demonstrating a marked genotoxicity of non reduced Graphene oxide.

References:

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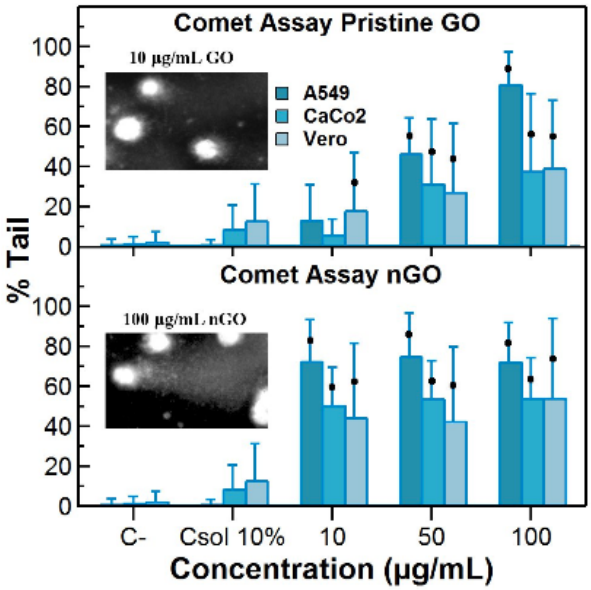

Fig.4: 24h Comet assay on the three selected cell lines for the geno toxic evaluation of both Pristine GO and nGO. The results are all compared to the negative control. The figure show a strict correlation between the dimensions of the nano-materials and the DNA damages in all the cell lines.