Spectroscopic contributions to the understanding of the toxicity of Particulate Matters (PM) and carbonaceous materials.

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In the past few years polyaromatic molecules, graphite and graphene have been, and still are, the center of active interest of chemistry and physics. It is a long time that Particulate Matter (PM),for its dangerous effects on human health, has been analyzed and is at the center of attention for very active research in the field of biology, environmental science, combustion technology , catalysis etc. A large body of experimental evidence indicates that PM and ultrafine particles are able to produce toxicity by enhancing the levels of reactive oxygen species (ROS) in the exposed cells. Despite the recognized role of ROS in inducing biological injury, such as inflammation and oxidative DNA damage, it is still debated whether ROS production is caused only by the specific components deposited or grafted on the surface of the carbonaceous particles (e.g. organic compounds, functional groups and/or metals) *or whether is the carbonaceous core itself able to promote ROS formation.*

During the past few years the group at Milano has been working on the Vibrational infrared and Raman spectroscopy, supported by DFT calculations, on suitably synthesized polyaromatic hydrocarbons (PAH) [1],i [2] on graphite and graphene. The study of the role of the edges and the size of the graphitic platelets in determining their Raman spectra [3] has seeded an interdisciplinary collaboration with the group of Padua (EPR) and the group of Milano Bicocca (cell biology) [4]. In this communication evidence is presented that the *carbonaceous core, naked from any organic and/or inorganic compounds, can promote ROS formation.in the human cells* . These results are new, may be alternative to the usually accepted mechanism for ROS formation by PM and open a broad new window to questions about graphitic materials as well to the understanding of their biological activity..

References

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