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## Surface analysis of nanomaterials: needs and challenges.

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It is recognized that detailed physico-chemical characterization of nanomaterials is becoming increasingly important both from the technological and from health and safety point of view. Moreover, an incomplete characterisation may inhibit or delay the scientific and technological impact of nanoscience and nanotechnology. However, nanomaterials characterization based on individual instrumental methods is a very challenging issue because their stability, coating and environmental effects may lead to outputs that are not very easy to interpret unequivocally. For this reason multiple analysis methods are needed to understand the nature of nanomaterials, especially if we consider that surface and interfaces are critical to the behaviours of nano-sized materials [1].

Surface chemical analysis methods, such as X-ray Photoelectron Spectroscopy (XPS) and Time of Flight Secondary Ion Mass Spectrometry (ToF-SIMS), can provide an important contribution to more fully characterizing nanomaterials, so these methods should be more generally applied as part of a characterisation set of tools for nanomaterials and nanoparticles synthesized for different applications [2]. Moreover, the use of advanced techniques based on synchrotron radiation and neutron scattering can also provide valuable data on nanoparticles [3-5]

In this work some examples of the use of surface analysis techniques for the characterisation of nanoparticles in complex matrices will be presented and discussed.

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**Primary author:** Dr CECCONE, Giacomo (European Commission, Directorate General Joint Research Centre, Directorate F –Health, Consumers and Reference Materials Consumer)

**Presenter:** Dr CECCONE, Giacomo (European Commission, Directorate General Joint Research Centre, Directorate F –Health, Consumers and Reference Materials Consumer)

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