

Analytical Strategies to Detect and Quantify Metal and Metal Oxide Nanoparticles for Human Exposure Assessment

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The term “nanomaterial” is defined by the European Commission Recommendation 2011/696/EU and used by several European Regulations (like Regulation EC 1223/2009 on cosmetic products), in order to ensure safe use of nanomaterials. Therefore, reliable measurement techniques are needed to characterize nanomaterials for size and chemical composition.

Counting methods as Single Particle Inductively Coupled Plasma Mass Spectrometry (SP-ICP-MS) and fractionation methods like Field Flow Fractionation (FFF) on-line coupled to Multi Angle Light Scattering (MALS) and ICP-MS were developed to qualify and quantify specific metal-nanoparticles (Ag, Au, TiO₂, ZnO) in different consumer products like sunscreens and tattoo inks and in human matrices as urine, serum and blood.

These techniques were appropriate for polydisperse samples and to determine low concentration of nanoparticles even at lower size (ca. 10 nm) than the Recommendation definition. These methods can be reliably used to ascertain the presence of metal-nanoparticles in consumer products and to assess the exposure of the population.