

X-ray photoelectron spectroscopy study on the effects of Ar<sup>+</sup> ion sputtering on the nature of mono- and bi-metallic nanoparticles

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X-ray photoelectron spectroscopy combined with Ar<sup>+</sup> ion sputtering is a powerful tool for investigating surface chemistry as well as for surface cleaning. The possibility of sputter damage is known but has not been sufficiently investigated in the case of nanoparticles. For this purpose, Fe, Pt and Pt<sub>x</sub>Fe<sub>1-x</sub> nanoparticles were synthesized using dry plasma reduction. Synthesized monometallic and bimetallic nanoparticles were widely studied according to their stability against ion sputtering. The experiment was conducted by applying various conditions for ion sputtering such as various ion beam currents, energies and time of sputtering. Indeed, the bimetallic nanoparticles showed low stability and high sensitivity to the damage caused by Ar<sup>+</sup> ion sputtering. On the basis of this finding, the reliability of the data obtained for nanomaterials can be rated. Another important point of this work is the suggestion of optimum operating conditions for Ar<sup>+</sup> ion sputtering prior to X-ray photoelectron spectroscopy measurements of nanoparticulate materials.