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DIMENSION AND CHEMICAL STATE CHARACTERISATION USING NEW VECTOR METHOD OF COPPER OXIDE NANOPARTICLES SUPPORTED ON GRAPHITE BY X-RAY PHOTOELECTRON SPECTROSCOPY

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(building 6, lecture hall F1 on ground floor, campus of Faculty of Science MU, Kotlářská 2, Brno)

This talk will discuss an accurate determination of quantitative chemical environment that is the main analysis field of XPS. In some rare trivial cases reasonable input models will not significantly influence the fit result. But in most cases, the accurate analysis of the chemical environment is completely depends on several complex parameters such as the number of peaks, component constraints and peak shape. The Informed Sample Model technique (ISM), that we developed, allows forming a set of data to extract the peak shape and the necessary number of components. ISM was applied to a real sample consisting of graphite-supported ultra-small copper nanoparticles catalysts used for the Meerwein arylation of pyrroles and 1,3-dipolar cycloadditions. It is well known that the XPS analysis of copper nanoparticles is a difficult case due to satellite peaks. One method to fit the data is to use reference samples with the assumption that the peak shape is independent of the particles size. We studied with the ISM technique the Cu 3p doublet to measure the relative proportions of copper species Cu_2O, CuO, $Cu(OH)_2$ using background subtracted components derived from Cu 3p. Both Cu 2p and Cu 3p data are derived simultaneously by vector transformations of raw spectra. The component model was capable of reproducing all Cu 3p spectra from a total of twenty seven different samples without relaxation of any fitting constrains in terms of position and shape