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WHAT CAN WE LEARN FROM COMPARATIVE CHARACTERIZATION OF MATERIALS ON THE MACRO- AND NANO-SCALE

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The physical and chemical properties of materials tested on the macro- or nano-scale may differ dramatically. For example, when measuring the Young39;s modulus of elasticity, we assume an “infinite”depth of material, which is not fulfilled especially when the Young’s modulus is measured at the nano-scale. Another example, the interaction of nanomaterials with biological environment and their toxicity is dependent on properties of individual nanoparticles, such as shape, surface passivation, zeta-potential (surface charge in colloidal state), chemical reactivity etc. and conflicting results about the same nanomaterial toxicity are published quite often. We decided to study those materials with our home-designed micro-spectroscopy setup combined with atomic force microscopy device equipped with several additional modules. In this contribution we would like to present our knowledge about studying various systems at nanoscale and their comparison to bulk measurements. The new field of nano-reconnaissance can help us to understand for example the chemical reactivity of nanoparticles or reasons of secondary inflammatory reactions caused by deformation of proteins in the protein corona formed on the nanoparticle in a living organism.

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