The material's response to mechanical loads depends on the scale in which this response is examined. For many years, the trend in material research has been to reduce scale, not only in relation to structure characteriztion, but also in the process of applying mechanical loads. The size of the tested samples is systematically reduced, or in the case of indentation tests, the tip radius and its penetration depth in the material are reduced. Depending on the size of the objects studied, we are talking about macro-meso- and nano-scale investigations. The project is devoted to microscale studies, where the dimension of objects or material volumes involved in test have dimensions of the order of micrometers. At this scale, the materials exhibit completely different mechanical properties than those that we observe at the macro scale. A material that shows isotropy at the macro scale, is usually anisotropic at the micro- scale. The plastic behavior of the material is described by much more complex laws than at the macro scale. In addition, we observe the size effect, which is often referred to as "smaller is stronger", i.e. the yield strength and tensile strength increase when we reduce the size of samples, or the hardness increases when we reduce the penetration depth or tip radius, thus reducing the material volume to be tested. Recent research indicates that there is a relationship between plastic strain hardening at the micro scale and strengthening resulting from the size effect. The study of this relationship was proposed in the project. In the investigations, the indentation tests at different scales as well as tensile tests of micro-samples will be used. To observe the deformed surface of the material, the atomic force microscope will be applied, while electron microscopy will be used to study the microstructure. Research conducted in the project will contribute to the modification of material models at the micro scale and will provide a verified input data to existing models.