

## **DESCRIPTION FOR THE GENERAL PUBLIC (IN ENGLISH)**

The main aim of this scientific project is to obtain new physical and mechanical theoretical basis of extremely important mechanism of inhomogeneous plastic deformation of face-centered cubic (FCC) metallic materials. The scientific concept of this project is based on new experimental findings of strong mechanical and microstructural anisotropy of layered FCC metallic materials and the discovery of new plastic deformation modes belonging to a group of mechanical detwinning mechanisms. The basic idea of this project is to activate, in a strictly controlled way, all possible mechanisms of detwinning which are responsible for shear band formation. Complex experimental studies of the structure using highly advanced research techniques of electron/x-ray diffraction, especially design mechanical testing of latent hardening type as well as theoretical analysis using correspondence matrix approach will give answers to two fundamental scientific questions: (I) which of the detwinning mechanisms is responsible for the process of shear band formation? and (II) what kind of crystallographic and mechanical conditions should be satisfied to totally eliminate shear banding during plastic deformation processes of layered FCC metallic materials? Obtaining answers to these questions is essential to have more complete knowledge regarding plasticity and strength of twinned FCC metallic materials and to create basis for innovative technology in the field of processing of advanced FCC materials. The experimental and theoretical results of the investigated plastic flow localization phenomena will provide new insights in the field of plasticity and texture development of low stacking fault energy FCC metallic materials. The crucial role of this project is also a professional development of young scientists working in the area of structural mechanics of crystalline solids. The results will be published in well-known scientific journals such as: *Acta/Scripta Materialia*, *Materials Science and Engineering A*, *Philosophical Magazine* and *Archives of Metallurgy and Materials*. Additionally, all the results obtain during the project will be announced at international and local scientific conferences.