The aim of the project is to recognize and describe the effect of heterophase interfaces on the strengthening of multi-layered nano-composites. Application of Ta/Cu, Nb/Cu, and Fe/Cu metals combination is proposed, representing the **bcc/fcc-type interfaces and** a combination of explosive welding (EXW) and accumulative roll bonding (ARB) technologies to fabricate industrial, full-sized, flat (semi)products of nano-composite character. *In the first step* the Cu/Ta, Cu/Nb, and Cu/Fe composites will be EXW-*ed* for manufacturing of multi-layered sheets composed of min. 10 layers, of alternatively placed sheets, with a ~ 0.5 mm thickness. I*n the second step*, these composites will be fabricated *via* repeated rolling, cutting, and stacking (up to 7-8 passes) with the rolling processes after intermediate annealing to achieve the final thickness of layers in nanometres scale. In selected cases, the last step of the rolling process will be carried out at liquid nitrogen temperature in order to icrease the intensity of the deformation twinning.

The research program that is proposed will be focused on the characterization of interphase boundaries between particular nano-layers and their role in nucleation and propagation of twins and shear bands. **In the performed research, it was preliminarily assumed that the interfaces can be in fact extremely thin reaction layers, composed of both elements and that by the methods based on *the grain boundary engineering* it is possible to increase the impact resistance of metals**. *On the one hand* the influence of the layer thickness on the slip propagation towards neighbouring layers, especially at high strain rates (using Drop Hammer) will be analyzed. *On the second hand*, there will be performed analyses of the damage process (during ballistic loading). In that case, the identification of the mechanisms responsible for the projectile penetration will be at the heart of interest. The issue will be combined with analysis of low-temperature plastic deformation effect on twinning and shear banding and then the voids nucleation.

Despite the issues investigated in the project are inspired by the actual problems resulting from industrial practice the project is within the group of research works of basic character. However, obtained results can be helpful in the future for the formulation of specific application recommendations. It concerns fundamental aspects of the microstructural transformations and new technologies of armoured materials producing. From the scientific point of view, the activities crucial for the practical application of the project results are the identification of phenomena taking place during strain localization and a demonstration of their connection with the impact resistance of the material. This description especially refers to the microstructural changes due to twinning and shear banding. Since the studies are of fundamental nature they would help to identify and describe the mechanisms responsible for crack propagation during impact loading. The latter are extremely interesting for the applications in the armaments industry since the materials modified by grain boundary engineering methods are especially suggested for potential industrial applications as materials exhibiting a high breakdown resistance. They can be used not only for the protection against ballistic operations but also the ones originating from other impact hazards, both to people and vehicles or buildings. This research will be a significant contribution to the research issues undertaken in Poland a few years ago, which were inspired by industrial practice.