Unconventional methods of deformations using high degree of plastic deformation allow to obtain grain refinement in the materials together with enhancement of mechanical properties. However, the mechanisms leading to such a significant improvement is still poorly understood especially in materials with hexagonal symmetry. Simultaneously emerging of new applications for materials affect the search for methods of obtaining them in a controlled way.

Within the project will be made attempts to determine the phenomena occurring in the low-alloyed zinc with the addition of magnesium (up to 1.5 %) during hydrostatic extrusion (HE). The motivation to undertake research were the last reports in the literature describing zinc as an ideal material for biodegradable bone implants and stents.

Biodegradable implants are made from materials that corrode with appropriate speed in vivo with secure response of the body to the released corrosion products. Research on biodegradable materials focused their attention mainly on iron and magnesium and their alloys. The research shows that these materials are not optimal. Magnesium corrodes too quickly in the human body - resorped before the healing of damaged tissue. On contrary, the iron has a very low corrosion rate and, consequently, is in contact with the tissue much longer than necessary, which may lead to complications for the patient. Interest in zinc and its alloys as a material for biodegradable implants does not take longer than decade. So far numerous researches concerning biocompatibility and corrosion tests emerged. A crucial drawback limiting the use of zinc is its insufficient mechanical properties. The use of small additions of alloying elements as magnesium leads to an improvement of these properties. Enhance in mechanical properties may also be achieved by proper methods of plastic deformation. Using conventional methods of plastic deformation does not make the desired results. Recent own studies revealed that better mechanical properties can be obtained by applying unconventional methods of deformation like hydrostatic extrusion. Nevertheless strengthening mechanisms appearing during this method are not fully explained, what makes impossible control received mechanical properties.

Thus description of deformation mechanisms due to HE is extremely important because it seems that by using this deformation technique to low-alloyed zinc with magnesium is an effective solution to the limiting application of zinc as a biodegradable implants. High deformation can also influence on corrosion behaviour. So it is important to understand this aspect too. Optimization of these properties is not possible without knowledge of deformation mechanisms leading to their improvement.