Materials such as magnesium, titanium, and zinc are linked not only by a similar crystal lattice, i.e., the arrangement of atoms in space but also by the fact that recently it is the fastest developing group of metallic materials due to the attractiveness of properties and the possibility of further applications. These materials are of particular interest to current medicine and bio-engineering.

Zinc possess an ideal dissolution rate in the human body, so it can be used for cardiological, urological stents or bone implants. However, it has a low melting point and low mechanical properties. By adding other elements and using deformation methods, these properties can be improved to meet requirements. However, it is necessary to know in detail the behavior of zinc alloys during deformation and to determine the influence of temperature on their properties after deformation.

The project provides research which will allow to define material behavior depending on the temperature. For comparison, materials such as pure zinc, zinc alloys with small additions of magnesium, and copper were selected. All materials will be deformed using hydrostatic extrusion. Advanced techniques of electron microscopy and a unique heating stage for simultaneous "in-situ" annealing in the microscope chamber and EBSD (backscattered electron diffraction) tests will be used for the research. This method allows the determination of specific material parameters depending on the temperature in selected areas of the material. These parameters provide information on what properties the material will have. To confirm the changes taking place in the material annealed in the microscope, tests outside the microscope, the so-called ex-situ research, needs to be performed. The conducted analysis will provide a large amount of data that needs to be developed and correctly interpreted, which requires appropriate software to be developed within the project. Moreover, the observed changes will be the basis for the development of a model that will be able to predict changes in the material depending on the selected initial parameters.