The growing demand for superfast computing systems that require more efficient cooling, and new technologies such as the EmDrive thruster that will need adequate power, require the development of new materials for cooling these systems. A new generation of nuclear reactors and internally cooled super processors have led to interest in low temperature alloys. Also, very interested aspect of potential coolants, the shape of which may be manipulated. The requirements are that such materials should be more efficient, and demonstrate higher thermal conductivity and thermal stability. Such requirements are fulfilled by liquid metal alloys, which are stable at high temperatures, and much more efficient than conventional cooling systems. To be able to apply appropriate alloys requires basic knowledge of their physicochemical properties. Such technology may appear to come straight from science fiction films, but research conducted around the world has confirmed the possibility of controlling the shape of liquid metal alloys, and of their capacity for independent movement. The pre-constructed device, an alloy of gallium, indium and tin in a solution of sodium hydroxide works very simply. Utilizing its own chemical energy, it can move continuously for an hour, flowing in a straight line and around a vial, and squeezing through complex shapes. Additionally, the newly constructed EmDrive thruster, which pushes the boundaries of modern physics and will, according to preliminary studies, be able to propel a vessel to 9.4 per cent of the speed of light in combination with a portable nuclear reactor with a capacity from 1 to 100 MW. This opens up the possibility of new, highly efficient generations of liquid metal cooled nuclear reactors, much smaller than conventional water-cooled models. This rapid growth of technology, and its potential applications, will revolutionize science and can bring measurable benefits in the coming years.

Based on analysis of the literature, it can be concluded that the Ga based alloys which have a melting point of about 0 °C can be used in cooling systems (for example, as coolants in nuclear power reactors or processors). Being able to manipulate the shape of such alloys means the shape of the circuit can be changed over time, depending on prevailing requirements, and this should further enhance the effect of improved heat removal from the system.

Test results achieved as a result of project implementation will constitute the basis for the design of new, more efficient cooling systems. The use of liquid metal as a cooling medium allows the size of the cooling circuit to be reduced, due to the much higher efficiency of these systems. The results obtained in this project, as a result of the comprehensive research, will be directed towards the main objective of the project, which is to create a physicochemical database to enable the development and use of alloys based on gallium.