Vacuum technologies are widely used in modern science and industry. For long-term unattended pumping without large and heavy vacuum equipment, which cannot be used (aircraft and spacecraft, small vacuum volumes, vacuum devices, inaccessible components of complex systems) non-evaporable getters (NEG) are successfully used. Furthermore, getters may be used for the creation of long-term vacuum heat insulation. The vacuum insulation allows to achieve exceptionally low heat losses.

The purposes of recent enhancement of NEG are reducing the activation temperature and increasing the sorption capacity. The most effective metals for NEG production are calcium, barium, titanium, zirconium, vanadium, niobium, chromium, iron and its alloys. Binary and ternary compounds of these metals are most promising. In this regard, TiV alloy, which can be activated at a low temperature, was selected for investigation.

In this study, the laboratory fabrication technology of non-evaporable getters was developed by sintering a powder of titanium-vanadium alloy. A few prototype samples of getters were prepared and investigated.

In order to investigate the characteristics of NEG, a high-vacuum system with ultimate pressure up to 1E-7 Pa was designed, including a heater, high-precision pressure sensors, QMS gas analysis, and calibrated gas inlet systems. It allows to change the temperature of samples in the range RT - 1000 K at gas pressure range 1E-3 – 1E5 Pa.

The basic characteristics of getter samples (activation temperature, the pumping speed and sorption capacity for several gases) were determined during experiments on the sorption and desorption of hydrogen. It was shown that the activation temperature of the TiV getter starts at 250°C and full activation is achieved at a temperature of 400°C. It was reached the maximum initial pumping speed 1.5 l/s/cm² for hydrogen and the maximum sorption capacity of 1.1E6 Pa·cm³/g.

Keywords: non-evaporable getter, gas sorption