FACILITY FOR SORBTION AND DESORBTION EXPERIMENT FUSION REACTOR MATERIALS

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One of the major problems of the fusion reactors (FR) development is the selection of structural and plasma-facing materials. The material choice takes into account many properties of the material, including ability of the material to accumulate hydrogen. For security reasons, the accumulation of hydrogen in materials of fusion reactors should be minimized, because tritium is radioactive.

The project of installation was developed to study the accumulation of hydrogen in fusion reactor materials (steels (Eurofer and Rusfer ), vanadium alloys, tungsten, etc.). At this installation samples will be exposed in hydrogen or deuterium atmosphere at elevated temperature, and the sorption of hydrogen and its isotopes will be measured. It will be possible to study the accumulation of hydrogen by thermal desorption (TDS). The method consists in registration of partial pressures of gases during heating of the sample.

A quartz tube with external heater will be used as a chamber for exposure and TDS. The residual pressure in the chamber will 10-7 Pa or better. The magnetic manipulater will be used for moving samples from the lock chamber to the registration chamber, allowing quick replacement of the sample without breaking the vacuum in the registration chamber. The samples temperature will be measured with a thermocouples. A programmable heating of the sample in a temperature range of 300÷1400 K will be implemented. The partial pressures of the gases desorbed from the sample will be measured using a calibrated quadrupole mass spectrometer MKS MicrovisionIP. The experiments will use hydrogen and deuterium gases purified by palladium filter.