

## **Fusion-related Tritium Research Activities in Japanese Universities**

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Present research activities on tritium in Japanese universities and institutes are reviewed, with focusing on the fusion reactor fuel cycle. In this field, Research Project on “Tritium Science and Technology for Fusion” (Grant-in-Aid for scientific research, Ministry of Education, Science, Culture and Sports, Priority Area No.467) are being carried out in the period of JFY 2007 through 2011. The purpose of this project is to organize many numbers of researchers in various related fields, and to establish a concept on reliable tritium fuel cycles and safe tritium confinement for economic and safe fusion reactors.

Tritium management in fusion reactor systems have several characteristic features. Tritium exists in the systems in many different chemical states from a dilute state in bulk materials at room temperature to a high-temperature plasma state at very high temperatures (around 10 keV). Consequently, there are many different important tritium-related phenomena to clarify, including impurity effects, chemical effects of beta-ray, isotope control, surface reactions, tritium-material interactions, plasma-surface interactions, etc. On the other hand, tritium amount managed in the fusion reactor systems is very large in comparison with that in the basic research up to the present. In such a sense, fusion research will be the first occasion in Japan for handling such a variety of chemical forms at one time and a large amount of tritium.

In the project, three major task teams are organized to study these subjects. The first task is to clarify the tritium behaviour in the vacuum chamber, including the evaluation of tritium amount accumulated in the first wall and its removal. The second task is to establish the blanket fuel cycle, including tritium production, recovery with  $TBR > 1.05$ , and impurity removal and isotope separation, etc. The third task is tritium safety confinement and the prevention of tritium permeation and leakage, including tritium monitoring for the wide amount range of tritium. The research results by the three task teams are reviewed annually by the management task not only from an individual technical point of view but also from a holistic point, and the comments are fed back to each task. In the presentation, some typical results obtained by the three task teams in the past three years are reviewed. In addition, recent Japanese research activities on environmental behaviour and biological influences of tritium are briefly introduced.