**FT/P1-09** · Development of Advanced Blanket Materials for Solid Breeder Blanket of Fusion Reactor

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**Abstract:** Advanced solid breeding blanket design in the DEMO reactor requires the tritium breeder and neutron multiplier that can withstand the high temperature and high dose of neutron irradiation. Therefore, the development of such advanced blanket materials is indispensable. In this paper, the cooperation activities among JAERI, universities and industries in Japan on the development of these advanced materials are reported. Advanced tritium breeding material to prevent the grain growth in high temperature had to be developed because the tritium release behavior degraded by the grain growth. As one of such materials, $TiO_2$-doped $Li_2TiO_3$ has been studied, and $TiO_2$-doped $Li_2TiO_3$ pebbles was successfully fabricated. For the advanced neutron multiplier, the beryllium intermetallic compounds that have high melting point and good chemical stability have been studied. Some characterization of $Be_{12}Ti$ was studied. The pebble fabrication study for $Be_{12}Ti$ was also performed and $Be_{12}Ti$ pebbles were successfully fabricated. From these activities, the bright prospect to realize the DEMO blanket by the application of $TiO_2$-doped $Li_2TiO_3$ and beryllium intermetallic compounds was obtained.



**FT/P1-10** · Neutronics Experiments for DEMO Blanket at JAERI/FNS

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**Abstract:** In nuclear fusion DEMO reactor, the blanket is required to provide the tritium breeding ratio (TBR) of more than unity by the neutron induced reaction in lithium in the blanket. To provide the TBR of more than unity is critical issue in the development of the blanket. Also in order to develop the blanket with low activation level, the evaluation of the induced activity with high precision is required by taking into account the sequential reactions induced by secondary charged particles. In order to evaluate these issues experimentally, neutronics experiments have been performed by using DT neutrons at JAERI/FNS. From the results of TBR experiment by using the mockup relevant to the DEMO blanket with multilayered structure composed of Be, $Li_2TiO_3$ and F82H, it was clarified that the TPR can be evaluated within 10 % uncertainty by using the Monte Carlo calculation. From the results of sequential reactions experiment for the test specimens simulating the cooling water pipe, it was found that the effective cross-sections due to the sequential reactions were increased in a form close to an exponential curve in the cooling water pipe with reducing the distance to the water.



**FT/P1-11** · Initial Three-dimensional Neutronics Calculations for the EU Water Cooled Lithium-Lead Test Blanket Module for ITER-FEAT

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**Abstract:** The water cooled lithium-lead DEMO relevant blanket is one of the two European blanket concepts to be further developed for manifacturing test blanket module (TBM) aimed for testing in ITER-FEAT. One of the objectives of testing is evaluation of neutronic behaviour of the TBM and validation of computer code estimates. The present work summarizes the preliminary results of 3D radiation transport analysis of the TBM by the use of the Monte Carlo code MCNP. Estimates of the nuclear energy deposition, tritium production and radiation damage through He and H production and atomic displacement are provided.