

## 9. Activities of Rokkasho Research Centre

At Rokkasho village in Aomori prefecture, International Fusion Energy Research Centre (IFERC) project and International Fusion Materials Irradiation Facility/Engineering Validation and Engineering Design Activities (IFMIF/EVEDA) project have been conducted under the Broader Approach (BA) agreement between EU and Japan. The roles of the Rokkasho Research Centre of NIFS are to assist NIFS and universities to cooperate with those activities, and to prepare the environment for promoting various collaborative researches including technology between activities at Rokkasho and universities. As cooperation activities, the head of the Rokkasho Research Centre of NIFS is undertaking jobs as the IFERC project leader, and the Rokkasho Research Center of NIFS has been set inside of the JAEA Aomori Research and Development Center, where IFERC and IFMIF/EVEDA projects are located. Also, a staff of the Rokkasho Research Centre of NIFS is working as a member of Joint Special Team for a Demonstration Fusion Reactor (DEMO) design, which is the organization for establishing technological bases required for the development of DEMO as all-Japan collaboration.

The mission of IFERC project is to complement ITER and to contribute to an early realization of the DEMO reactor, and so IFERC project implements the 3 sub-projects; DEMO Design and R&D Coordination Centre, Computational Simulation Centre (CSC), and ITER Remote Experimentation Centre (REC). The mission of DEMO Design and R&D Coordination Centre is to coordinate/implement scientific and technological DEMO activities necessary for performing activities on DEMO pre-conceptual Design and on R&D of DEMO technology. The mission of CSC is to provide a state-of-the-art supercomputer and to exploit high performance and large-scale fusion simulations, in order to analyse experimental results, to prepare ITER operational scenario, to predict ITER performance, and to contribute to DEMO design physics and to BA activities. In the case of REC, the mission is to prepare ITER remote experiments and to verify the functions by using JT-60SA and EU tokamaks. The IFERC project is implemented almost on schedule according to the Work Programme 2015 and the Project Plan approved at BA Steering Committee meetings.

The DEMO Design Activities (DDA) work of the Phase Two-C: Pre-conceptual design phase, started from January 2015. The main areas of advance in 2015 are 1) scoping of DEMO design points, physics basis and scenario modeling, 2) studies on key design issues and their assessment in the integrated conceptual design, 3) DEMO plant system design and 4) consolidation of structural material database. For scoping of DEMO design points and scenario modeling, the scoping of DEMO design points was focused on crucial parameters of aspect ratio and plasma elongation. The optimization of vacuum vessel and conducting shell design (double-loop shell) to increase plasma elongation is in progress. Position control analysis

indicated a prospect of increasing plasma elongation. The DEMO R&D activities in the five task areas (T1: SiC<sub>f</sub>/SiC composites, T2: Tritium technology, T3: Material engineering, T4: Advanced Neutron multiplier, T5: Advanced Tritium breeders) have been carried out successfully in accordance with the original and amended Work Programme 2015 and Procurement Arrangements (PAs). As to EU/JA joint collaboration, the first analyses of surface morphologies of ILW-JET carbon dust particles started for T2 and evaluation of compatibility of SiC/SiC composites with liquid Pb-Li metal have been conducted for T1. Fatigue tests under a push-pull, reversed torsion and circle loadings were performed on F82H and the high temperature tensile test is carried out on a variant of F82H for T3. Fundamental granulation technology for beryllides has been established for T4, and Li<sub>12+x</sub>TiO<sub>3+y</sub> pebble fabrication by the emulsion method has been shown to be a promising technique for their mass production for T5.

The CSC activity has progressed in full accordance with the project plan and with the schedule of the various PAs. The activity was performed by the IAs in coordination with the Standing Committee (StC) regarding the selection of simulation projects, allocation of computer resources and evaluation of user reports. The Integrated Project Team (IPT) of CSC including HPC team continuously and dedicatedly supports users and operation of Helios, leading to stable operation with a high availability ratio, high utilization rate and 512 (accumulated number) peer-reviewed papers accepted or published in scientific journals. The 4<sup>th</sup> cycle of the regular simulation projects has been completed, and the last 5<sup>th</sup> cycle is ongoing. As planned, dismantling of the supercomputer will start in January 2017.

Based on the overall plan of REC, development of the software for REC successfully is continued in collaboration with the Satellite Tokamak Programme (STP), which is other project in the BA activities carried out at JAEA Naka site, in order to test functionality of the remote experiment. A part of installation of REC network and a part of interior works of REC room have been completed in February and March 2016, respectively, and the verification tests of REC function started.

In addition, the Rokkasho Research Centre performs communication works with the organization related to ITER-BA, Aomori prefectural office, and Rokkasho village office, and publicity works to have villagers understand the research of the nuclear fusion.

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