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## DEMO R&D Activity

### New Collaborative R&D Activity Starts about Study of Dust and Deposition Layer in Joint European Tours (JET)

In the vacuum vessel of a fusion reactor, the material of wall surface (tile) is exposed to the plasma. This plasma surface interaction produces fine grains like powder and a re-deposition layer on the tile. It is well known from previous studies that fine grains, which are called "dust", and the re-deposition layer contain a high concentration of hydrogen isotopes. This means that an appreciable amount of tritium exists in the dust, and affects the fusion fuel cycle. It is a significant issue to decrease the amount of dust not only for the future DEMO reactor but also for ITER. For this reason, tungsten has been selected as the target material of the ITER divertor. To study divertor effects for ITER, the Joint European Tours (JET) in UK has installed a tungsten coated material in the divertor and carried out the plasma experiment of ITER like Wall (ILW). Japan and EU decided to carry out the characterisation of dust and the re-deposition layer of JET during ILW experiment as part of the DEMO R&D of Broader Approach (BA) activity. The DEMO R&D facility at Rokkasho is a unique facility in the world and can handle tritium, beryllium and activation materials at the same time. Several valuable analysis techniques are available at the facility: focused

ion beam, transmission electron microscope and thermal desorption spectroscopy. The data from the analysis of the dust and re-deposition layer will give research scientists in the world valuable information for the operation of ITER and the design of DEMO reactor.

Dust and tiles containing re-deposited layers were collected and these are being transferred to IFERC now. Dust samples were packed in the shipping container shown in Figure 1 and arrived at DEMO R&D facility on 18 August 2014. The study of the dust, including the measurement of the tritium inventory, the microstructure, and the chemical content of the dust has started. Figure 2 shows a preliminary result of microstructure studies of the dust. The results of this collaboration are expected to lead to a large step forward in the DEMO design and the development of tritium accounting operation for ITER. Researchers in Europe, where JET is located, and also other interested parties in ITER are awaiting our results with great interest.

*(Toshihiko Yamanishi)*



Figure 1. Shipping container for dust sample  
Dust sample contains 80GBq of tritium and Type A Package was needed for the transportation.

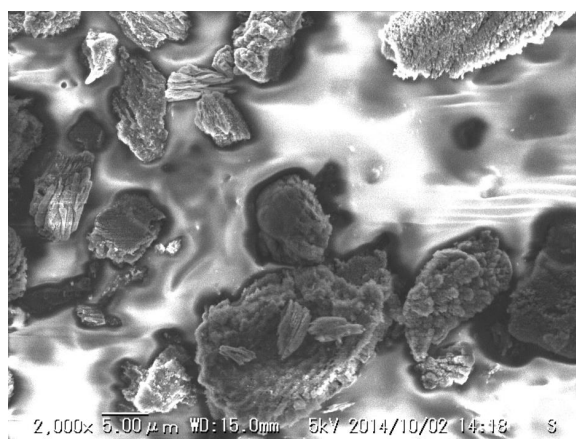


Figure 2. Observation result of dust sample  
Dust sample was observed with scanning electron microscopy.