Measurements of the dust property in experiment and post-campaign sampling on JT-60U Tokamak

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Understanding of dust property in a fusion reactor such as its size, number density and locations generated/deposited is of a great importance to predict impurity contamination and tritium retention. Transport of the carbon dust as well as the dust property have been studied in JT-60U tokamak.

In the plasma experiments, the laser scattering measurement showed that huge number of dust, with the different intensity of the scattering signal, were ejected into the main chamber at disruptions and in the following discharges. Static analysis of the dust event number as a function of the signal intensity provided a Probability Distribution Function (PDF) of the dust particles. In the plasma discharges, both the dust number and intensity were peaked in the far-SOL, i.e. outer flux surface in the scrape-off layer, near the plasma facing component (PFC) and they decreased near the separatrix (near-SOL). This result suggests that sublimation of the dust is dominant even in the SOL.

After the experiment campaign, sampling of dust particles (using dry vacuum pump and fine membrane filter to collect small dust of the size larger than 0.1 mm) was recently performed over the PFC surfaces including the tile surface, edge, and underneath the tile and the divertor. Microscope measurement of the dust particles and static analysis will show PDF of the dust number density and size at the different area of the PFCs. Comparison of the dust analysis results from the scattering measurement and post-campaign sampling is discussed to provide evaluation of potential sources of impurity and hydrogen retention by the carbon dust. Measurement of the hydrogen isotope deposition in the dusts will be also planned by Thermal Desorption Spectroscopy.