Effects of plasma incident angle of dust production due to interactions between hydrogen plasmas and carbon wall

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Dust formation in fusion devices is of critical importance because of safety and operational issues [1-3]. Here we have examined effects of a plasma incident angle toward a carbon wall on dust production to clarify the dust formation mechanisms.

Experiments were carried out with a helicon discharge reactor described elsewhere [2]. In this reactor, dust particles were generated due to interactions between hydrogen helicon discharge plasmas and a graphite target. Total discharging period was 600 s. Dust particles were collected with dc biased Si substrates of 15x10 mm\textsuperscript{2} set on the reactor wall at 110 mm below the graphite target. An area density of the collected dust particles on the Si substrates were measured with a SEM. The dust flux toward the substrates from the graphite target was deduced from the area density and the discharging period.

Collected dust particles can be classified into two kinds: spherical particles and flakes. Figure 1 shows dependence of the dust flux on a plasma incident angle $\theta$. The dust fluxes of spherical particles and flakes for $\theta = 45^\circ$ are much higher than the fluxes for $\theta = 0$ and $60^\circ$. These results indicate that the dust generation rate strongly depends on the plasma incident angle.

References