

(TG1) Multi-ion Plasma group report



Oct. 12, 2022 (H. Kasahara)

Date: Oct. 7, 2022 1.8

Time: 13:25~17:15

Shot# 180076~180134

Prior wall conditioning: No

Gas puff: D₂, Ar, IPD: (Li, B, C)

Pellet: No

NBI(1, 2, 3, 4, 5) = gas(H, H, H, H, H) = P(3.1, 4.4, 0.98, 6.0, 5.0) MW

ECH(56GHz, 15U) = P(0.0) MW

ECH(77GHz, 55Uo, 2Our) = P(0.70, 0.79) MW

EH(154GHz, 2Oll, 2Oul, 2Olr) = P(0.72, 0.80, 0.83) MW

ICH(38.47MHz, 3.5U, 3.5L, 4.5U, 4.5L) = P(0.84, 0.81, 0.89, 0) MW

Neutron yield integrated over the experiment = 1.8×10^{13}

Topic

1. The investigation of the impurity shielding performance of the ergodic layer using the impurity powder dropper (180076~180107) (M. Shoji)
2. ICRF heating system commissioning for D(H) plasmas(180108~180134) (H. Kasahara)

The investigation of the impurity shielding performance of the ergodic layer using the impurity powder dropper (M. Shoji)

- Shot No: #180076~#180106 (7th Oct. 2022)

- Experimental conditions:

(R_{ax} , Polarity, B_t , γ , B_q): ~#180096 (3.60 m, CW, 2.75 T, 1.2538, 100.0 %), #180097~ (3.75 m, CW, 2.64 T, 1.2538, 100.0 %) , Gas fueling: D₂, IPD: (Li, B, C), NBI: #1, #2, #4, #5 (duration is 2 s), $n_{e,bar}=2\sim6E+19\text{ m}^{-3}$

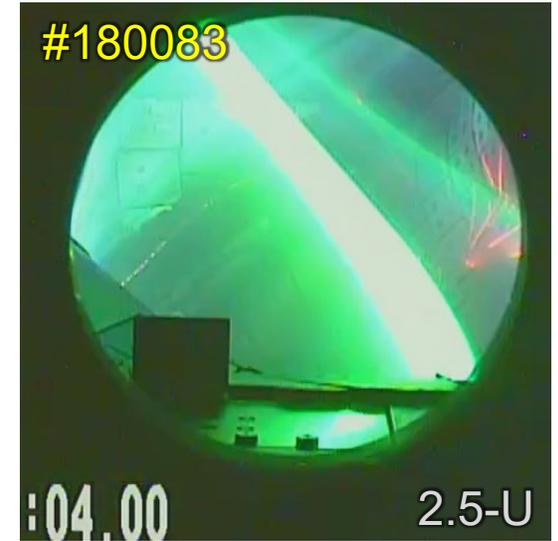
- Background and motivation:

- The DUSTT code predicts the dust shielding effect in the LHD peripheral plasma for higher plasma densities by the effect of the plasma flow in an upper divertor leg.
- For validating the simulation results, Li, B, and C dust powder trajectories and the evaporation/sublimation positions in the peripheral were observed with a stereoscopic fast-framing camera newly installed in 2.5-U.

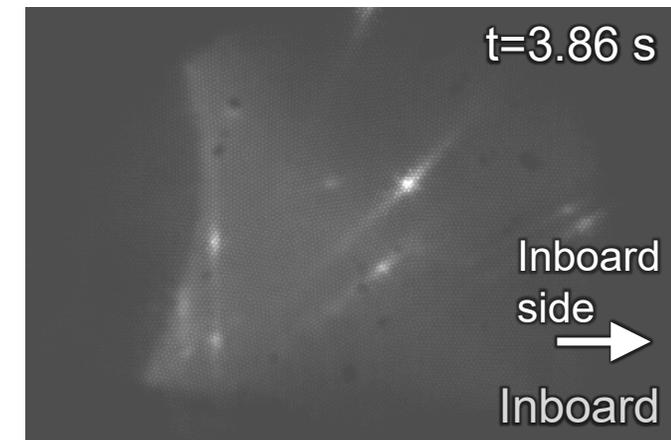
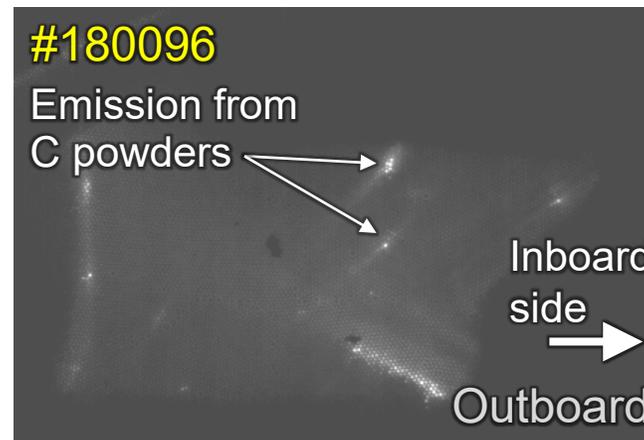
- Preliminary results:

- Li powders were successfully injected by the IPD.
- Many moving bright spots were observed during the impurity powder dropping with the stereoscopic fast-framing camera.
- Three-dimensional dust trajectories in different plasma densities, dust materials, and magnetic configurations will be analyzed in near future.

Li powder injection



Observations with a stereoscopic fast framing camera



ICRF heating system commissioning for D(H) plasmas

H. Kasahara, T. Seki, K. Saito, R. Seki

Shot #: 180108 - 180134 (27shots)

Experimental conditions: (R_{ax} , Polarity, B_t , γ , B_q) = (3.60 m, CW, 2.75 T, 1.2538, 100.0%), (3.60 m, CW, 2.65 T, 1.2538, 100.0%)

Purpose:

- Confirming fast ion productions with two magnetic configurations (2.75T(STD), 2.65T(On-Axis)) in various heating powers.

Experimental result:

- We conducted D(H) heating at four different heating powers (2, 1.5, 1, 0.5 MW), but unfortunately, we could not reduce hydrogen concentration to less than 10%, about 50%.

- The Neutral particles corresponded to the density rather than the ion temperature, but the counts decreased as the ICH heating power decreased. In the two magnetic configurations, there were no apparent differences in neutron counts.

