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Effects of Magnetic Filter SMF on the Reduction in Co-Extracted Electrons for Cs-free Negative Ion Source Using TPDsheet-U

TPDsheet-U[1] has been designed to research behaviors of the negative hydrogen ions (H^-) in the high-density sheet-plasma, which is optimized for volume production. Also, H^- is produced by volume production at periphery of sheet plasma.[2] The reduction of the electron co-extraction is an essential issue for all negative-ion sources. We are currently researching the extraction system for reduction of the co-extracted electrons.[3,4] In this contribution, we represent the improved extraction system on TPDsheet-U by attaching the soft magnetic material plate for magnetic filter (SMF) on plasma grid for reduction of co-extraction electrons. The minimum current ratio I_e/I_{H^-} and H^- current density J_{H^-} was ~ 0.2 and $2.2\text{mA}/\text{cm}^2$ at discharge current of 50A.

[1]K.Hanai, *et al.*, *Plasma Fusion Res.* (2020).

[2]K.Hanai, *et al.*, *Fusion Eng. Des.* (2019).

[3]H. Kaminaga, *et al.*, *Rev. Sci. Instrum.* (2020).

[4]H. Kaminaga, *et al.*, *Fusion Eng. Des.* (2021).

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