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Development of a compact cascade arc discharge apparatus and its application to generation of a sheet plasma TAKUMI YAMAGUCHI, TAKAHIRO SHUGYO, KOHEI FUKUYAMA, MD. ANWARUL ISLAM, Hiroshima University, NAOKI TAMURA, National Institute for Fusion Science, SHINICHI NAMBA, Hiroshima University, HIROSHIMA UNIVERSITY TEAM, NATIONAL INSTITUTE FOR FUSION SCIENCE COLLABORATION — Plasma window has a high potential as novel vacuum interface, which can separate vacuum from atmosphere without solid materials. Electron beam welding under an atmospheric condition is one of the applications of the plasma window. Cascade arc discharge device having a channel diameter of 3 mm, therefore, has been developed and characterized by visible and vacuum UV emission spectroscopy. On the other hand, the sheet plasma with a thickness of <1 mm and a width of >10 mm is also attractive as the vacuum interface to isolate between upper and lower region. To this end, we applied the magnetic field on the cylindrical plasma expanding from the arc discharge channel. Here, the magnetic field was formed by the combination of two opposing permanent magnets and an external solenoid coil, resulting in the creation of sheet-shaped plasma. Dependence of the thickness and width of the sheet plasma on the geometry and strength of the magnetic field was investigated.

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