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Structure and behavior of the imploding plasma in a laser triggered vacuum arc EUV source QIUSHI ZHU, JUNZABURO YAMADA, NOZOMU KISHI, MASATO WATANABE, AKITOSHI OKINO, KAZUHIKO HORIOKA, EIKI HOTTA, Department of Energy Sciences, Tokyo Institute of Technology, Nagatsuta 4259 J2-35, Midori-ku, Yokohama 226-8502, Japan. — Dynamics of the imploding plasma and the relations with 13.5 nm EUV emissions in a laser assisted Sn based discharge produced plasma EUV source under moderate discharge current (17 kA amplitude, 120 ns risetime) have been experimentally investigated using time and spatially resolved laser shadowgraphy and Nomarski interferometry techniques. During compression, the imploding plasma shells and the zippering effect that the pinch collapses first from the anode side, and then along the remaining plasma column to the cathode side were observed. As soon as the plasma reaches the maximum compression, the sausage instability exists. The corresponding electron density map indicates that the radial density distribution displays an annular-shape at the crest of the plasma while a near-parabolic-shape at the neck, the maximum of the electron density is located at one peak of the annular distribution at the crest instead of the neck. It is also found that relatively strong EUV radiation is generated by the Z- pinch plasma with electron density larger than $1.5\text{x}10^{24}$ m^{-3}. However, shock waves due to the expansion of the plasma attaching on the anode can also cause weak EUV radiation.

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