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Ti Beam Extraction from Laser Plasma Transported by Solenoidal Magnetic Field

In a laser ion source (LIS), a target material in a vacuum chamber absorbs focused laser energy to produce a dense plasma, from which the beam is extracted. The LIS can generate plasma from a variety of solid targets, and the ion species can be easily changed by replacing or mounting multiple target samples. Based on this feature, we are developing a LIS for ion implanters requiring a wide variety of ion species.

The LIS plasma spreads three-dimensionally with a wide angular distribution, and only the ions in the plasma that reach the extraction electrode aperture are extracted. Therefore, only a small fraction of the generated ions is used as a beam. In order to obtain higher beam intensity by increasing the number of ions reaching the beam extraction region, we have developed a plasma transport and beam extraction system with a solenoid magnet that suppresses the plasma spreading by an axial magnetic field. At the conference we will present experimental results of extracting an ion beam from a Ti plasma transported in a solenoidal magnetic field. This work was supported by JSPS KAKENHI Grant Number 18K11937, 21H03749

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