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Laser Plasma Generation System with Controlled Interpulse Delay Between two Laser Shots

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The 400 kV ion implanter in TIARA facility [1] provides variety of low charge DC ion beams of C, Al, Ti, Cu, Au, Pt, etc. mainly for material sciences. Most of beams are produced from solid materials by a Freeman type ion source equipped with sample vaporization oven. In the case of high melting point materials, the beam current is insufficient (below a few microamps) and decreases with time. Additionally, conducting experiments using multiple kinds of ions is difficult because the change of ion species is difficult due to long heating time of the oven (2-3 hours).

In order to resolve above problems, we are developing a laser ion source (LIS) as a high-intensity heavy ion source for the implanter. A LIS can generate high-intensity ion beams from almost any solid material by irradiating a focused high-intensity pulsed laser onto a target. Ion species can be changed by replacing target materials or mounting multiple targets on a target holder.

To apply LIS as an ion source for the implanter, high-repetition operation is required to obtain sufficient number of particles for experiments. In order to clarify the pulse interval at which plasma is generated stably, we constructed a system that can irradiate two laser beams at the same position of the target material at an arbitrary time interval.

The details of the system and results of the plasma generation by changing irradiation time interval of two lasers will be presented.

References

[1] Y. Saitoh et. al., Nucl. Instrum. Methods Phys. Res. B 89 (1994) 23

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