

Abstract Submitted
for the DPP14 Meeting of
The American Physical Society

Amplification of 126 nm femtosecond seed pulses in optical-field-induced Ar plasma filamentation SHOICHI KUBODERA, NAOYUKI DESHIMARU, MASANORI KAKU, MASAHITO KATTO, University of Miyazaki — We have observed amplification of femtosecond (fs) VUV coherent seed beam at 126 nm by utilizing an optical-field-induced ionization (OFI) high-pressure Ar plasma filamentation. We have produced a low-temperature and high-density Ar plasma filamentation inside a high-pressure Ar cell by irradiating a high-intensity laser with an intensity of approximately 10^{14} Wcm⁻². Argon excimer molecules (Ar₂^{*}) as an amplifier medium were produced inside the high-pressure cell and were used to amplify a weak VUV ultrashort seed pulse at 126 nm, which was generated by harmonic generation of another short pulse infrared laser at 882 nm. We have measured the amplification characteristics and the OFI plasma diagnosis by utilizing the fs VUV pulses at 126 and 882 nm, respectively. The maximum optical gain value of 1.1 cm⁻¹ was observed. Temporal behaviors of the plasma temperature and density in the nano-second time scale indicated a high-density and low-temperature plasma produced by using the OFI. These plasma behaviors were utilized to reproduce the optical amplification characteristics with our OFI excimer simulation code.

Shoichi Kubodera
University of Miyazaki

Date submitted: 23 Jun 2014

Electronic form version 1.4