Abstract Submitted
for the GEC12 Meeting of
The American Physical Society

Amplification of femtosecond vacuum ultraviolet laser pulses at 126 nm in an optical-field-induced ionized argon plasma[1] SHOICHI KUBODERA, MASANORI KAKU, Dept. of EEE and Photon Science Center, University of Miyazaki, MASAHITO KATTO, CRC, University of Miyazaki, KENZO MIYAZAKI, IAE, Kyoto University — Short-wavelength lasers in the vacuum ultraviolet (VUV) spectral region between 100 and 200 nm have not yet been developed to the same degree as visible and infrared lasers. We have been developing the argon excimer laser at 126 nm by using an optical-field-induced ionized (OFI) argon plasma. We have observed the gain of 0.86 /cm at 126 nm in the OFI Ar plasma, which was produced inside a hollow fiber with a diameter of 250 microns and a length of 5 cm. In this paper, we have used the OFI plasma gain medium as an amplifier of the 126 nm radiation. A femtosecond 126 nm pulse was produced by the seventh-order nonlinear wavelength conversion of a femtosecond Ti:sapphire laser at 882 nm. The femtosecond wavelength-converted coherent VUV beam was then injected inside the OFI plasma that was produced by the same Ti:sapphire laser, resulting in a 2.4-fold increase of the VUV intensity with one-pass amplification. The gain-length product of 0.87 with the one-pass amplification was evaluated, which was consistent with the value we have observed in the previous measurements. The further extension of the OFI plasma by using a hollow fiber would be plausible to increase the gain-length product and the VUV amplified intensity.

[1]Part of this work has been supported by Hamamatsu Photonics K. K., Japan.

Shoichi Kubodera
Dept. of EEE and Photon Science Center, University of Miyazaki

Date submitted: 06 Jun 2012 Electronic form version 1.4