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Vacuum ultraviolet argon excimer laser excited by optical-fieldinduced ionized electrons produced in an argon-filled hollow fiber¹ SHOICHI KUBODERA, MASANORI KAKU, MASAHITO KATTO, Dept. of EEE and Photon Science Center, University of Miyazaki, Gakuen Kibanadai Nishi 1-1, Miyazaki, 889-2192, Japan — 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 demonstrated the production of argon excimers via an optical-field-induced ionization (OFI) process by using a high-intensity infrared laser. We here report optical amplification of argon excimers at the wavelength of 126 nm by producing an extended OFI plasma inside an argonfilled hollow fiber with an inner diameter of 250 microns with a length of 5.0 cm. A gain-length product of 4.3 through the use of single-pass amplification with VUV optics was observed, indicating a small signal gain coefficient of 0.86 cm^{-1} with an uncertainty of 0.03. It was found that the hollow fiber served to extend the OFI plasma length and to guide the excitation of the infrared laser and the produced VUV emissions at 126 nm, but did not affect the OFI plasma conditions to produce argon excimer molecules.

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