第67回応用物理学会春季学術講演会 講演予稿集 (2020 上智大学 四谷キャンパス)

Two-photon laser-induced fluorescence of hydrogen atom in EUV photoionized plasma

ILE Osaka Univ.[1], Mechatronics R&D Center, Samsung Electronics Co. Ltd.[2], Samsung R&D Institute Japan[3]

◦(P) Baojun Zhu[1], (D) Chang Liu[1], Nozomi Tanaka[1], Kyung Sik Kang[2], Youngduk Suh[2], Jeong-Gil Kim[2], Ken Ozawa[3], Takeshi Takagi[3], Minoru Kubo[3], Shinsuke Fujioka[1]

E-mail: baojunzhu@ile.osaka-u.ac.jp

Hydrogen flow can be applied to buffer the ions produced by the extreme ultraviolet (EUV) source and reduce the deposition rate on collector in the EUV lithography. However, the hydrogen gas can also be photoionized by the EUV radiation. Detailed information including absolute densities and temperature of the production under various conditions is needed in order to understand and predict their long-term impact on highly delicate optics in EUV lithography tools. Hydrogen radical is one of the most important production due to EUV dissociative photoionization. Laser-induced-fluorescence (LIF) is used to observe spatial distribution and temporal evolution of the hydrogen radical. In the experiment, hydrogen radical is excited from $1s^2S$ to the $3s^2S$ and $3d^2D$ levels with two photons near 205.14 nm, and then, the fluorescence at Balmer-α near 656.28 nm can be observed. The density is determined from the intensity of the fluorescence excitation spectrum, whereas the temperature is inferred from the line shape.