

Dependence of EUV emission characteristics from Xe cryogenic targets on laser wavelength

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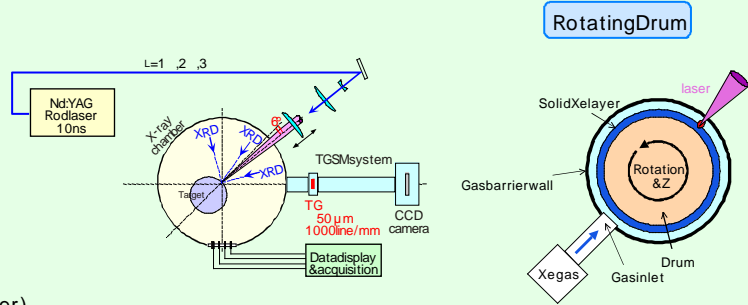
Parametric studies of EUV emission were made experimentally for fundamental and higher harmonics wavelength of Nd:YAG laser, 1064, 532 and 355 [nm]. Our drum target system supplied fresh surface of cryogenic solid state Xe target continuously to the laser focus point. Dependence of CE (Conversion Efficiency) on focus-lens position & laser wavelength are reported.

Experimental Setup

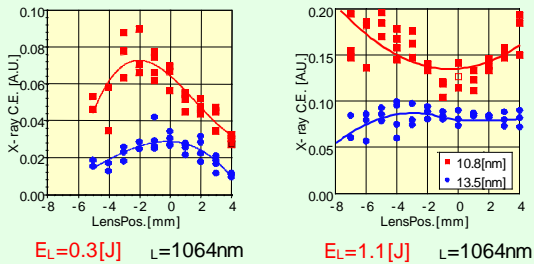
Laser system: Pulse width $t_L = 10$ [ns]
 Energy $E_L < 1.2$ [J] at 1064 [nm]
 $E_L < 0.6$ [J] at 532 [nm]
 $E_L < 0.4$ [J] at 355 [nm]

Target system: solid Xe on rotating cryogenic drum
 Rotations speed 0 ~ 1000 [rpm]
 Temperature of drum 77 [K] (LN₂)
 Thickness of X-layer 500 [μm]

Measurements system:
 X-ray Diode (AXUV-20 with Mo/Si filter)
 Transmission Grating SpectroMeter (TGSM)

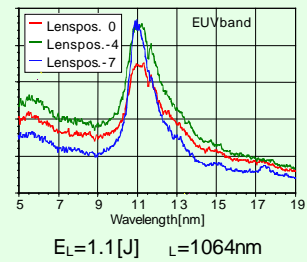


Dependence of CE on focus lens position

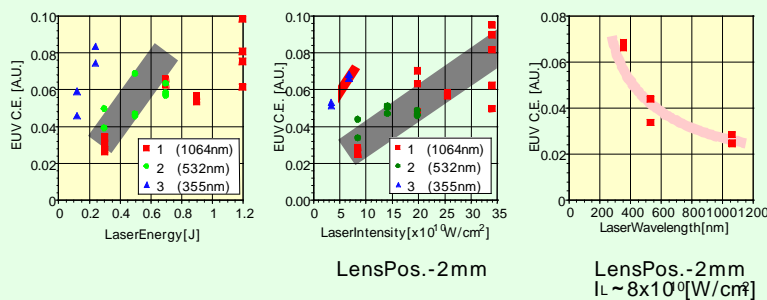


The laser was focused on the target at the 0-position. (-:infocus, +:outfocus)

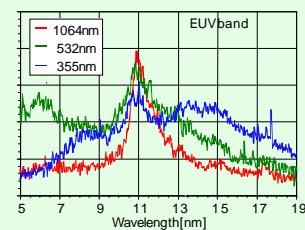
X-ray Spectra for different lens positions



Dependence of CE on laser wavelength



X-ray Spectra at $t_L = 1064, 532,$ and 355 [nm]



Summary

It was found that EUV emission spectra depend on focus-lens position and laser wavelength. An optimum focusing condition or optimum laser intensity was found to exist. The conversion efficiency at the 355 [nm] was observed to be about 2 times higher than that at the 1064 & 532 [nm].

To determine an absolute value of CE, a calorimeter is being prepared.