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Simulations of plasmas driven by laser wavelengths in the 1.064 − 10.6 µm range as future extreme ultraviolet light sources

Stan J.J. de Lange,[1,2] **Diko J. Hemminga**,[1,2] **Oscar O. Versolato**,[1,2] **and John Sheil**[1,2]

[1] *Advanced Research Center for Nanolithography, Science Park 106, 1098 XG Amsterdam, The Netherlands*

[2] *Department of Physics and Astronomy, and LaserLaB, Vrije Universiteit Amsterdam, De Boelelaan 1081, 1081 HV Amsterdam, The Netherlands*

We characterize the properties of extreme ultraviolet (EUV) light source plasmas driven by laser wavelengths in the $\lambda_{\text{laser}} = 1.064 - 10.6$ µm range and laser intensities of $I_{\text{laser}} = 0.5 - 5 \times 10^{11}$ W cm^{-2} for $\lambda_{\text{laser}} = 1.064$ µm. Detailed numerical simulations of laser-irradiated spherical tin microdroplet targets reveal a strong laser-wavelength dependence on laser absorptivity and the conversion efficiency of generating EUV radiation. For $\lambda_{\text{laser}} = 1.064$ µm irradiation, the increase in in-band radiation with increasing laser intensity is offset by only a minor reduction in conversion efficiency. Radiative losses are found to dominate the power balance for all laser wavelengths and intensities, and a clear shift from kinetic to in-band radiative losses with increasing laser wavelength is identified. Yet, with increasing laser intensity, such a shift is absent. We find that the existence of a maximum conversion efficiency, near $\lambda_{\text{laser}} = 4$ µm, originates from the interplay between the optical depths of the laser light and the in-band EUV photons for this specific droplet-target geometry.