Characterizations of a Nd:YAG laser-driven plasma

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Droplet-based EUV light source

Pre-pulse technique for target preparation
ns-laser-driven droplet expansion

Propulsion and deformation of tin droplet

Ø 45 μm
Propulsion and deformation of tin droplet

ns-laser-driven droplet expansion

Propulsion and deformation of tin droplet

D. Kurilovich et al, Phys. Rev. Appl. 6, 014018 (2016);
H. Gelderblom, JFM 794, 676 (2016);

$W_e \propto \frac{E_{\text{kin}}}{E_{\text{surf}}}$
ps-laser-driven droplet expansion

Cavitation and spallation from shockwaves

Ø 30-45 µm

is AN, Moscow:
A. Y. Vinokhodov et al, Quant. Electr. 46, 23 (2016)
15-ps-pulse impact on tin microdroplets

15-ps-pulse impact on tin microdroplets

Expansion of the tin shell
15-ps-pulse impact on tin microdroplets

Hole opening time
15-ps-pulse impact on tin microdroplets

Summary diagram

Late-time mass distributions are governed by Weber number
Plasma-induced pre-deformation of subsequent droplets

$l=2$ mode of oscillation

Experiment at ARCNL

Modeling from R. S. Abhari, et al.,

*J. Micro/Nanolithography, MEMS, and MOEMS, 11*(2), 021114 (2012)
ps-pulse-driven droplet expansion

pre-deformation oblate vs prolate; side views
EBIT: Charge-state-resolved spectra

4p⁶ 4dᵐ – 4p⁶ 4dᵐ⁻¹ 5p + 4p⁶ 4dᵐ⁻¹ 4f + 4p⁵ 4dᵐ⁺¹

preliminary data
EBIT: Charge-state-resolved spectra

preliminary data

4p⁶ 4dᵐ – 4p⁶ 4dᵐ⁻¹ 5p + 4p⁶ 4dᵐ⁻¹ 4f + 4p⁵ 4dᵐ⁺¹

4s² ¹S₀ - 4s4p ¹P₁

uncorrected electron beam energy (eV)

wavelength (nm)

preliminary data
EBIT: Charge-state-resolved spectra

4p^n \rightarrow 4p^{n-1} 4d + ...
Ion energy distribution

- Self-similar solution by Mora *PRL* 90, 185002
  \[ \frac{dN}{dE} \propto (E/E_0)^{-1/2} \exp\left(-\sqrt{E/E_0}\right) \]

- Self-similar solution by Murakami *PoP* 12, 062706
  \[ \frac{dN}{dE} \propto (E/E_0)^{(\alpha-2)/2} \exp\left(-E/E_0^\alpha\right) \]

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