Abstract

The influence of laser irradiance on Cadmium (Cd) and Niobium (Nb) plasma parameters using Nd:YAG laser (λ=1064 nm, τ=10 ns) at different irradiance ranging from 1 GWcm^{-2} to 2 GWcm^{-2} has been investigated. Faraday Cup (FC) technique was used to evaluate the fluence and kinetic energy of Cd and Nb plasma. The peak value of electronic signal enhances from 11.1 V to 25.1 V for Cd and from 9.6 V to 20 V for Nb by increasing irradiance, whereas, peak value of ionic signal varies from 4.7 V to 19.8 V for Cd and 3.8 V to 14.4 V for Nb. The kinetic energy of electrons increase from 15 keV to 55 keV for Cd and from 1.2 keV to 2.6 keV for Nb, whereas, fluence increases from 16×10^{9}cm^{-2} to 34×10^{9}cm^{-2} for Cd and from 3×10^{9}cm^{-2} to 13×10^{9}cm^{-2} for Nb by increasing irradiance. Similarly, the kinetic energy of plasma ions increases from 20 keV to 48 keV for Cd and 0.9 keV to 1.4 keV for Nb, whereas, fluence increases from 3×10^{9}cm^{-2} to 12×10^{9}cm^{-2} for Cd and from 1×10^{9}cm^{-2} to 8×10^{9}cm^{-2} for Nb by increasing irradiance. By increasing irradiance, the increase in peak value of electronic and ionic signals, FWHM as well as fluence and Kinetic energy is attributed to the increase in mass ablation rate and collisional frequency due to more energy deposition. The higher values of electronic and ionic signals as well as fluence and kinetic energy of Cd plasma as compared to Nb plasma are attributed to low melting point, reflectivity and ablation threshold fluence