Analyses of femtosecond laser ablation of Ti, Zr, and Hf
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Abstract
Femtosecond laser ablation of Ti, Zr and Hf has been investigated by means of in-situ plasma diagnostics. Fast plasma imaging with the aid of an intensified charged coupled device (ICCD) camera was used to characterize the plasma plume expansion on a nanosecond time scale. Time- and space-resolved optical emission spectroscopy was employed to perform time-of-flight measurements of ions and neutral atoms. It is shown that two plasma components with different expansion velocities are generated by the ultra-short laser ablation process. The expansion behavior of these two components has been analyzed as a function of laser fluence and target material. The results are discussed in terms of mechanisms responsible for ultra-short laser ablation.

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