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Spatial evolution of femtosecond-laser-induced aluminum plasma observed by picosecond time-resolved x-ray absorption spectroscopy[1] YASUAKI OKANO, Institute of Laser Engineering, Osaka University, KATSUYA OGURI, NTT Basic Research Laboratories, TAKESHI KAI, RYOU FUJII, HIROAKI NISHIMURA, Institute of Laser Engineering, Osaka University, TADASHI NISHIKAWA, HIDETOSHI NAKANO, NTT Basic Research Laboratories — The dynamics of the laser ablation plasma was investigated by using a developed system for spatiotemporally-resolved soft x-ray absorption spectroscopy, which uses a femtosecond-laser-induced plasma x-ray source. We observed an ablation plume generated by irradiating an Al target with a 120-fs-laser pulse at 10^{14} W/cm^2. The Al $L_{\mathrm{II,III}}$ absorption edge in the spectra showed blueshifts indicating the states of aluminum due to differences in continuum levels of Al atoms. To assign the shifted edges, energy levels of isolated Al atoms were calculated using an atomic code. The evolving laser-ablation plume was found to form a multi-layer structure consisting of vaporized and condensed Al particles, following the expansion of plasma. The details of the experimental results and the analysis will be discussed.

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