TIME-RESOLVED FOURIER TRANSFORM INFRARED EMISSION SPECTROSCOPY OF LASER ABLATION PRODUCTS

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Time-resolved Fourier transform infrared spectroscopy[a] was applied for observations of emission spectra from Nd:YLF laser ablation products. A high-repetition rate laser (Photonics Industry DM10-527, 2.5 kHz) with 1-2 mJ output power was focused on a rotating rod of metal and carbon mounted on a linear actuator. The infrared emission spectra from Fe, Cu, Zn, and Al atoms were observed in the 2.5-5 μm region with a time profile showing maximum emission intensity in 3-5 μsec after a laser shot. The time profile was explained by diffusion process. The observed emission spectrum from iron ablation in the 2500 cm^{-1} region agrees very well with solar absorption spectrum, where new lines have been detected in the present experiment in addition to the lines observed from a hollow cathode discharge[b]. When O_2 was added to the carbon ablation, emissions from vibrationally excited CO was observed with a vibrational temperature of $\sim$12300 K. Based on the observed time profiles, relaxation processes will be discussed.

[a] K. Kawaguchi, O. Baskakov, Y. Hosaki, Y. Hama, and C. Kugimiya, *J. Chem. Phys. Letters* **369**, 293 (2003).
[b] G. Nave, S. Johansson, R. C. M. Learner, A. P. Thorne, and J. W. Brault, *Astrophy. J. Suppl. Ser.* **94**, 221 (1994).