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LIF Measurement of Time-Dependent Spatial Density Distribution of Cu Atoms Ejected from a YBaCuO Target in Magnetron Sputtering Plasmas JUNSI GAO, NAYAN NAFARIZAL, KOICHI SASAKI, HIROTAKA TOYODA, MASUMI INOUE, AKIRA FUJIMAKI, SATOSHI IWATA, HIDEO SUGAI, Department of Electrical Engineering and Computer Science, Nagoya University, Furo-cho, Chikusa-ku, Nagoya 464-8603, Japan — Magnetron sputtering deposition techniques have a great potential in high quality high T_c superconductor film. We used a two-dimensional laser-induced fluorescence method to measure the time-dependent spatial density distribution of Cu atoms ejected from a YBaCuO target in RF-magnetron sputtering plasma. It has been first found that the sputtered Cu density was changed with both time and discharge conditions. This was different from the case of Cu metal target, where the Cu density depends only on discharge conditions. Therefore, the time-dependent spatial distribution of Cu density was investigated systematically in various discharge conditions. At low gas pressure, the density was increased at the beginning of discharge, then decreased, and finally reached a stationary value within a few minutes. The differences between initial value and stationary value were about two times. However, at high gas pressure, the stationary density was decreased to one-fifth of the initial value, and the transition time became 16 min. These observations are crucial for optimizing the deposition conditions of high T_c superconductor film.

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