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Formation mechanism of indium-zinc-oxide film using RF magnetron sputtering based on optical diagnostics of gas phase TAKAYUKI OHTA, MARI INOUE, NAOKI TAKOTA, Faculty of systems engineering, Wakayama University, MASUFUMI ITO, Faculty of Science and Technology, Meijo University, MASARU HORI, Graduate School of Engineering, Nagoya University — TCO (transparent conductive Oxide) film has been used as transparent conducting electrodes of optoelectronic devices such as flat panel display, solar cells, and so on. As increasing the demand of high quality TCO film, various TCO film has been intensively investigated as promising alternatives Indium Tin Oxide (ITO). The advantages of Indium-Zinc-Oxide (IZO) are wide process window, chemical stability, high surface smoothness, and so on. Diagnostics of plasma is important for controlling sputtering process precisely and clarifying the formation mechanisms of thin films. The absolute densities of Zn and In atom were simultaneously measured by an absorption spectroscopy employing the compact multi-micro hollow cathode light source. Their densities were measured to be 10^8 from 10^9 cm^{-3} and increased with an increase in the pressure. The behavior of In/Zn concentration ratio in the film measured by XPS corresponded to that of the absolute density in plasma. At RF power of 50 W and pressure 0.8 Pa, the optical transmission was more than 80 % in the region of 400 to 800 nm and the low resistivity of 10^{-3} to 10^{-5} Ωcm was obtained.

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