

Abstract Submitted
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Measurements of absolute densities of nitrogen and oxygen atoms in sputtering plasma for fabrication of ZnInON films KOICHI MATSUSHIMA, TOMOAKI IDE, Kyushu University, KEIGO TAKEDA, MASARU HORI, Nagoya University, DAISUKE YAMASHITA, HYUNWOONG SEO, KAZUNORI KOGA, MASAHARU SHIRATANI, NAHO ITAGAKI, Kyushu University — Control of chemical composition in films is of great importance in controlling the physical properties. Recently, we have developed ZnInON (ZION) with tunable band gap over the entire visible spectrum [1]. Due to the deviation from its pseudo-stoichiometry $((\text{ZnO})_x(\text{InN})_{1-x})$, however, the films have a number of crystal defects. In this study, with the aim of precise control of the chemical composition, we have measured absolute densities of N and O in sputtering plasma during deposition. ZION films were deposited with Ar/N₂/O₂ gas mixtures. The absolute densities of N and O were measured by vacuum ultraviolet absorption spectroscopy. With increasing O₂/N₂ flow rate ratio from 0 to 15%, N density increases from $2.7 \times 10^{11} \text{ cm}^{-3}$ to $9.7 \times 10^{11} \text{ cm}^{-3}$, while O density is almost constant with the value of $4.5 \times 10^{11} \text{ cm}^{-3}$. These results indicate that incorporation of O atoms into ZION films increases with increasing the O₂ flow rate ratio. Furthermore, we found that ZION films with pseudo-stoichiometric composition are grown at the O₂/N₂ flow rate ratio of 15%, where ZION films have low defect density.

[1] N. Itagaki, et al., Mater. Res. Express 1, 036405 (2014).

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