

Abstract Submitted  
for the GEC15 Meeting of  
The American Physical Society

**Measurements of nitrogen atom density in N<sub>2</sub>/Ar sputtering plasma for fabrication of high-mobility amorphous In<sub>2</sub>O<sub>3</sub>:Sn films**  
TOSHIYUKI TAKASAKI, TOMOAKI IDE, KOICHI MATSUSHIMA, Kyushu University, KEIGO TAKEDA, MASARU HORI, Nagoya University, DAISUKE YAMASHITA, HYUMWOON SEO, KAZUNORI KOGA, MASAHARU SHIRATANI, NAHO ITAGAKI, Kyushu University — Amorphous In<sub>2</sub>O<sub>3</sub>:Sn (a-ITO) has attracted attention because of the advantages such as smooth surface and high etching rate. We have recently succeeded in sputtering deposition of a-ITO films with high mobility 61 cm<sup>2</sup>/Vs by introducing N<sub>2</sub> into the deposition atmosphere. Here, aiming to clarify effects of N of a-ITO film growth, we measure absolute density of N atom in N<sub>2</sub>/Ar sputtering plasma by using vacuum UV absorption spectroscopy. ITO films were fabricated by RF magnetron sputtering on glass substrates at 150C with Ar-N<sub>2</sub> mixed gas. We observed that the morphology is changed from polycrystalline to amorphous by introducing N<sub>2</sub> into the deposition atmosphere. Furthermore the mobility of a-ITO films was found to be greatly dependent on N<sub>2</sub> flow rate. The electron Hall mobility increases from 48 to 55 cm<sup>2</sup>/Vs with increasing N<sub>2</sub> flow rate ratio from 3 to 5%, where the absolute density of N atom in the plasma increases from 3.78 to 7.44 (10<sup>10</sup> cm<sup>-3</sup>). Since the N composition ratio in ITO films is almost constant for N<sub>2</sub> flow rate ratio of 3–5%, the difference in the adsorption/desorption behavior of N atoms on the growth surface brings about the change in the film properties.

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Date submitted: 18 Jun 2015

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