[T-32]

The changes of chemical bonding of nitrogen with varying the oxygen incorporation within the indium oxy-nitride thin films.

Yeonjin Yi, Y. S. Roh, Yong-Duck Chung, Shin Cheul Kim,
Hyun-Joon Shin* and Kwangho Jeong
Institute of physics and applied physics and Atomic-scale surface science research center,
Yonsei University, Seoul, 120-749, Korea
*Beamline Research Division, Pohang Accelerator Laboratory, Pohang University of Science and Technology, Pohang, Kyungbuk, 790-784, Korea

The polycrystalline indium oxy-nitride thin films were grown by the reactive RF magnetron sputtering on corning 1737 glass substrates with varying the partial pressure of each component of sputtering gas (the mixture of oxygen and nitrogen). The oxygen partial pressure of the sputtering gas was increased gradually to change the chemical composition of each film. The chemical composition was confirmed with the Rutherford back-scattering spectroscopy (RBS). From the XRD spectra, we observed that the structural transition from nitride having preferred orientation of c-axis to polycrystalline oxide with the increasing the oxygen incorporation. The broad peak due to crystalline oxides shows that the film has small grains of the crystalline. The band gap of the films was changed abruptly from InN (1.9 eV) to In2O3 (3.6 eV) as the structure transition went on. And we found there are 4 phases in the films by measuring the x-ray absorption spectra (XAS). Those are indium nitride, indium oxide, molecular nitrogen and In-N-O complex phase. The In-N-O complex phase observed with XAS is also consistent with the result of the XPS measurement.