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Evaluation of aluminum nitride films deposited by using magnetron sputtering technique under controlled gas flow YUSUKE OHTSUKA, Osaka University — Non-destructive inspection technique using ultrasonic wave, generated by an electromagnetic acoustic transducer (EMAT), is introduced for the in-service inspection of fast breeder reactors. However the ultrasonic signal shows a low signal to noise ratio, so that a new structure of EMAT with multi-layers of thin films has been proposed. The author has already studied the deposition multi-layers of aluminum nitride (AlN) as an insulator and copper (Cu) as a conductor, but the bad adhesion on the substrate and the micro-cracks on the film were observed due to large residual stresses. This is a problem to be solved for the current driven EMAT. The present study aims to improve the characteristic of AlN films by controlling the mixing ratio of charged gases. AlN films deposited by controlling a nitrogen gas flow in step during deposition have been investigated using magnetron sputtering. The X-ray diffraction (XRD) spectrum of the deposited AlN films shows two distinct peaks at $2\theta = 33$ and 36 degrees, corresponding to orientation of (100) and (002) of AlN films, respectively. The (002) preferred orientation at 2 sccm increment of N2 gas flow is obtained, while it gradually proceeds toward (100) when the N2 gas flow in steps is more slowly increased. In the case of 0.5 sccm increment, a strong (100) preferred orientation with a weak (002) peak is found. However the two weak XRD peaks resulting from aluminum also are found.

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