スパッタリングを用いた強誘電体 AlScN 膜の室温形成

Ferroelectric properties of room-temperature sputter-deposited AlScN films

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【Introduction】

Ferroelectricity in $Al_{1-x}Sc_xN$ films has been reported in 2019 with a large remanent polarization of over 100 μC/cm^2[1]. Many kinds of research, including deposition, characteristics, and reliability, have been conducted so far. In this presentation, we will show the ferroelectricity of room-temperature deposited $Al_{0.78}Sc_{0.22}N$ films [2].

【Experiments and results】

A 50-nm-thick $Al_{0.78}Sc_{0.22}N$ film was deposited by DC reactive sputtering from an $Al_{0.57}Sc_{0.43}$ target. TiN layers are deposited for both top and bottom electrode materials in the same chamber without breaking the vacuum. We have set the deposition temperature at room temperature. The top electrodes are formed by wet etching. For comparison, a sample deposited at 400°C is fabricated.

Fig 1 showed the polarization-voltage measurements. A high remanent polarization (P_r) of 70 μC/cm^2 is obtained for the RT-deposited sample. A higher P_r value concerning the 400°C-deposited sample is attributed to the orientated growth of the AlScN grains confirmed by x-ray rocking curve measurements.

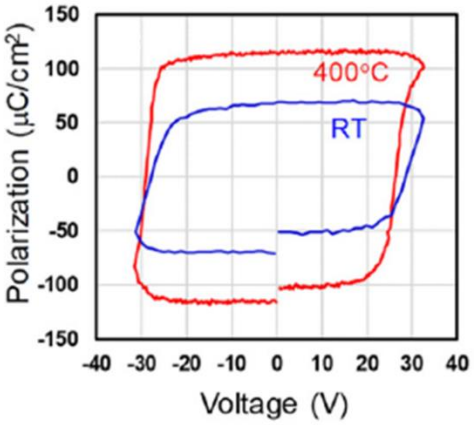

Fig 1 Polarization meaurement results by changing the deposition temperature.

【Conclusion】

A room-temperature deposited 50-nm-thick AlScN film was characterized. A high P_r of 70 μC/cm^2 was obtained. The physical and detailed electrical characterization will be presented at the meeting.

【Reference】[1] S. Fichtner, *et al.*, *J. Appl. Phys.*, **125**, 114103 (2019). [2] S. Tsai, *et al.*, *Appl. Phys. Lett.*, **118**, 082902 (2021).