

Residual Stress Measurement of Thin Films using X-Ray Diffraction

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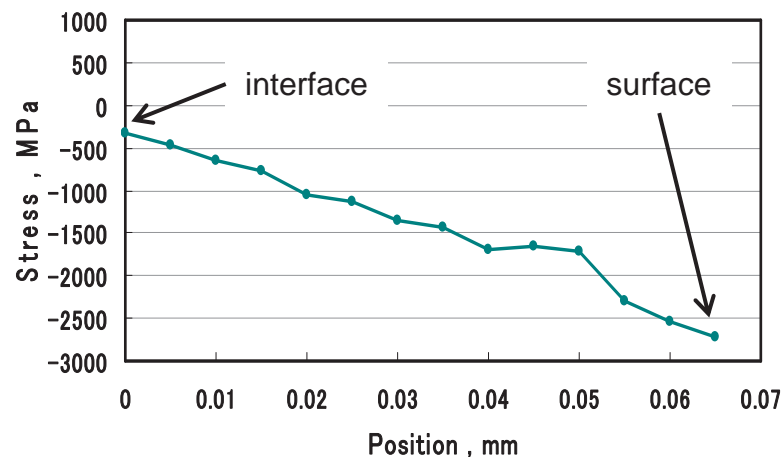
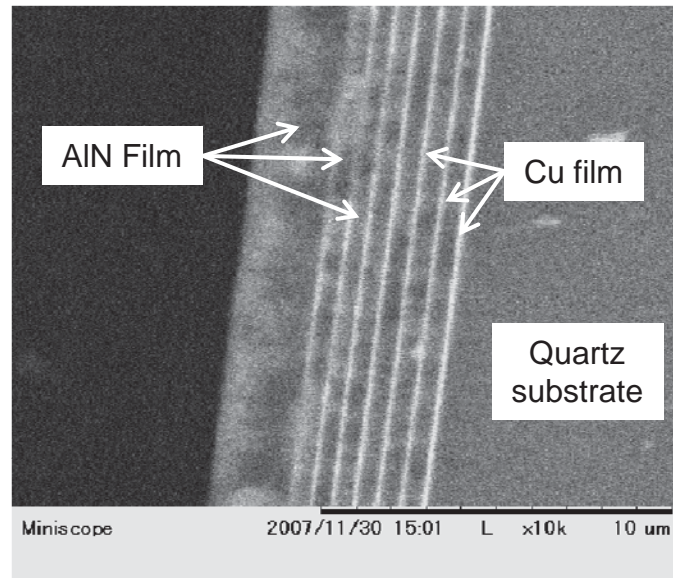


Fig.1. Internal stress of Cu layers in AIN/Cu multi-layers film

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Coating is one of the surface modification technology. The mechanical properties of materials is improved by coating the film which has different mechanical properties. However, residual stresses occur in the film because of difference in lattice spacing and thermal expansion coefficient between the film and the substrate. Significant residual stress may lead to micro-cracking or cause the film to peel from the substrate. Therefore, measurement and control of residual stress is crucial for the synthesis of mechanically stable films.

It is possible to measure the residual stress of the films non-destructively using the X-ray diffraction method. As typical results, we proposed the stress measurement method for the c-axis oriented films such as AIN, GaN, and ZnO film. Our research target is to obtain high quality films which have high crystalline and small residual stress.

The left figure shows residual stress measurement result which was carried out at SPring-8 of JASRI.

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