Residual stresses were determined in magnetron-sputtered Ag thin films of 400 nm thickness by asymmetric Bragg scattering. The corresponding \( \cos^2 \alpha \sin^2 \psi \) plots were nonlinear which indicates a strong residual gradient along the depth of the samples. The in-plane stress was highly compressive at the sample surface and became tensile at the interface. The out-plane stress was compressive and reached its maximum at the sample interface. The stress gradient changed significantly with post-annealing temperature. A Young’s modulus of \( E = 83 \text{ GPa} \) and a Poisson ratio of \( \nu = 0.3 \) were measured by surface acoustic wave dispersion.

**Key words:** Residual Stress Gradient; Thin Films; X-Ray Scattering; Surface Acoustic Wave; Grazing Incidence Diffraction.