

Surface Wave Propagation in Thin Silver Films under Residual Stress

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Investigations using surface acoustic waves provide information on the elastic properties of thin films. Residual stresses change the phase velocity of the surface waves. We have calculated the phase velocity and dispersion of surface waves in thin silver films with a strong [111]-fibre texture. A non-linear description of surface waves propagating along the [110]-direction of the substrate has been developed on the basis of an acoustoelastic theory, taking into account residual stresses. The relative change $\Delta v/v$ of the velocity v was found to be linear for large excitation frequencies. The dispersion curves were measured using a photoacoustic method. For sputtered polycrystalline thin silver films we found good agreement between the experimental and calculated dispersion curves for frequencies up to 225 MHz.

Key words: Ultrasonic Surface Waves; Photoacoustic; Thin Films; Residual Stress; Texture.