Session: FP

Effect of RF Bias Sputtering on Texture and Residual Stress of AlN Films Deposited on Pt/TiO_x/Al_2O_3 Multilayer Structures Using the Combined X-Ray Analysis

Abstract # 277

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Abstract:

AlN films obtained by reactive RF sputtering in a mixed Ar-N_2 discharge were studied to improve the piezoelectric effect and evaluate the mechanical properties of Pt/AlN/Pt high temperature dynamic pressure transducers deposited on TiO_x/Al_2O_3 insulating layers. The influence of the applied substrate average bias voltage (from +11 V to -50 V by self-tuning or RF biasing) on texture, residual stress, morphology and chemical composition of AlN films was observed. Quantitative texture analysis of AlN and Pt films and residual stress in AlN layers were determined using the combined analysis approach operated on x-ray diffraction data. Morphology and chemical composition of films were analysed by scanning electron microscopy and energy dispersive x-ray spectroscopy. The films exhibit slight changes in the AlN orientation for +11 V and 0 V bias voltages but a strong increase of the AlN {0001} texture component with a bias voltage between 0 V and -23 V. The compressive residual stress in the films is an increasing function of the negative bias voltage. This is accompanied by a change in oxygen content and morphology of AlN films. A possible explanation for these changes lies in the effect of incident ions on the adatoms, together with roughness and surface morphology modifications of Pt/TiO_x/Al_2O_3 underlayers.

Note: Requested a Poster Session.