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Growth and Characterization of Multilayered Pt-Co Alloy Thin Film on Si as a New Type of Standard Material for Surface Compositional Analysis

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Abstract

For materials analysis by surface-sensitive analysis methods, the surface contaminated layer should be removed. Sputtering by ion bombardment is one of the most widely used methods to remove it. To improve the accuracy of quantification in surface analysis, the sputtering condition must be kept the same for all the standard samples and the specimens. For this purpose, A multilayered structure of five layers with the alloy composition Pt100, Pt75-Co25, Pt50-Co50, Pt25-Co75, Co100 was grown on a flat Si(100) surface. One set of composition calibration curve can be obtained by depth profiling analysis of the multilayered alloy thin film.

To grow the multilayered thin film, an ion beam sputter deposition chamber was connected to a multitecnique surface analysis system through high vacuum tunnel and the composition and chemical state of the thin films could be analyzed by in-situ XPS analysis without exposing in the air. The relative composition of each element could be controled by varing the relative irradiating area of the neibouring two targets and in-situ XPS analysis. The thickness of each layers were 20 nm. The impurity and relative composition were controled by in-situ SIMS and XPS analysis.

The original composition of the alloy surface was analysed by in-situ XPS analysis and ex-situ RBS analysis. The composition change of each alloy layers was also analyzed by XPS, AES sputter depth profiling. The effect of sputtering was studied at various sputtering condition.