

A Study of Nitrogen Adsorption on Ti Surface by AES Factor Analysis

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Understanding the interaction between titanium and nitrogen is very important because of many applications of titanium nitride as decorative and tribological thin film. Nevertheless, the quantitative study of N adsorption on Ti using Auger electron spectroscopy (AES) has been impossible because of the serious overlap of the N $KL_{23}L_{23}$ and Ti $L_{3}M_{23}M_{23}$ Auger peak at ~ 387 eV.

This overlapping problem was overcome by applying target factor analysis to pure Ti sample and TiN thin film. The TiN film was prepared by arc-induced ion-plating (AIIP) process, and the stoichiometry was measured very accurately by Rutherford backscattering spectrometry (RBS).

N was adsorbed on polycrystalline Ti at different sample temperatures. The composition of N was found by the aforementioned factor analysis. We also obtained the approximate sticking coefficients and the temperature dependence of the initial sticking coefficients, which was interpreted well by Kisliuk model. The application of Kisliuk model enabled us to evaluate various adsorption parameters.