Data interpretation of angle resolved ESCA measurements of self-assembled monolayers on silicon substrates

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Today self-assembled monolayers gain ever higher interest. The wide spread field of their applications in coating technology give rise to serious research in formation and structure of the monolayer films. There are hardly any other organic films, which are as well known as self-assembled monolayer films. Therefore these films can serve as test objects for analytical methods.

Electron spectroscopy for chemical analysis (ESCA) is an appropriate surface analytical tool for thin films. The scope of the analytical possibilities of ESCA comprises the ordinary identification of the chemical elements, the determination of the binding states of an element, film thickness measurements and reconstruction of depth profiles of an element in a single oxidation state from the intensities of angle resolved ESCA measurements.

In this study octadecylsiloxane (ODS) films deposited on silicon/siliconoxide were researched with angle resolved ESCA. The thickness of the native silicon oxide layer was determined and the results checked by means of ellipsometer measurements. Then the thickness of the ODS layer was calculated in terms of the inelastic mean free path (IMFP) of the photoelectrons, utilizing the calculated thickness of the native silicon oxide layer. Afterwards the IMFP was calculated using the thickness given by the ellipsometer measurements. The results were compared to the IMFP's calculated from empirical formulas.

ACKNOWLEDGEMENT: