

NUCLEAR MICROANALYSIS  
STUDY OF SURFACE NANOLAYERS  
IN GOLD-SILICON STRUCTURES

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S u m m a r y

The Rutherford backscattering and particle-induced X-ray emission methods are used to study the surface layers in gold-silicon structures, the parameters of which govern the operational characteristics of electron devices constructed on their basis. The measurements are performed on a high-precision micro-analytical unit "Nuclear scanning probe" recently put into operation at the "Spectrum" laboratory. The thicknesses of a gold layer sputtered onto the specimen surface were about 17 and 20 nm for two different specimens. The layer non-uniformity was less than 1.6 nm and did not exceed the experimental error. A substantial amount of the fluorine impurity was revealed under the gold layer in the gold-silicon interface layer. Probably, it may be remnants of fluorine remaining after the etching of the silicon surface in a mixture of acids that included the hydrofluoric one (HF). The amount of fluorine detected in a series of measurements was found to strongly correlate with the current of alpha-particles at the target surface during the spectrum measurement. Since the local heating of the target depends on the current, it is evident that the local diffusion rate of fluorine atoms varied over the target surface.