

# RBS METHOD FOR STUDYING OBJECTS WITH A NON-PLANAR SURFACE

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Traditionally, the RBS method is used to study samples with a flat surface, but it is often necessary to study samples with a cylindrical surface. To improve the corrosion properties of fuel tubes in nuclear reactors, their structural phase state is modified. The purpose of this study is to develop a method for the analysis of cylindrical samples by the RBS method.

The objects of study were samples of zirconium alloy E110 of different geometric shapes: R1 - flat, R2 - cylindrical. A metal coating of Cr, Al, Ni was applied to a flat sample R1. Then, to improve the adhesion of the metal coating to the substrate, ionic mixing was performed with argon ions with energy of 30 keV. The cylindrical sample has a thin oxide film that appeared after ion polishing with argon ions energy of 5 keV.

The study of the elemental composition of the modified surface of the samples was carried out by the RBS method. The energy of helium ions was  $E_0 = 2$  MeV, the scattering angle  $\theta = 170^\circ$ , the angle of incidence of alpha particles  $\alpha = 30^\circ$  and  $60^\circ$ . A gallium phosphite (GaP) sample was used for calibration. After obtaining experimental data, modeling and analysis of the spectrum was carried out using the SIMNRA program. Figure 2 shows the RBS energy spectra of planar (a) and cylindrical (b) samples from the E110 zirconium alloy.

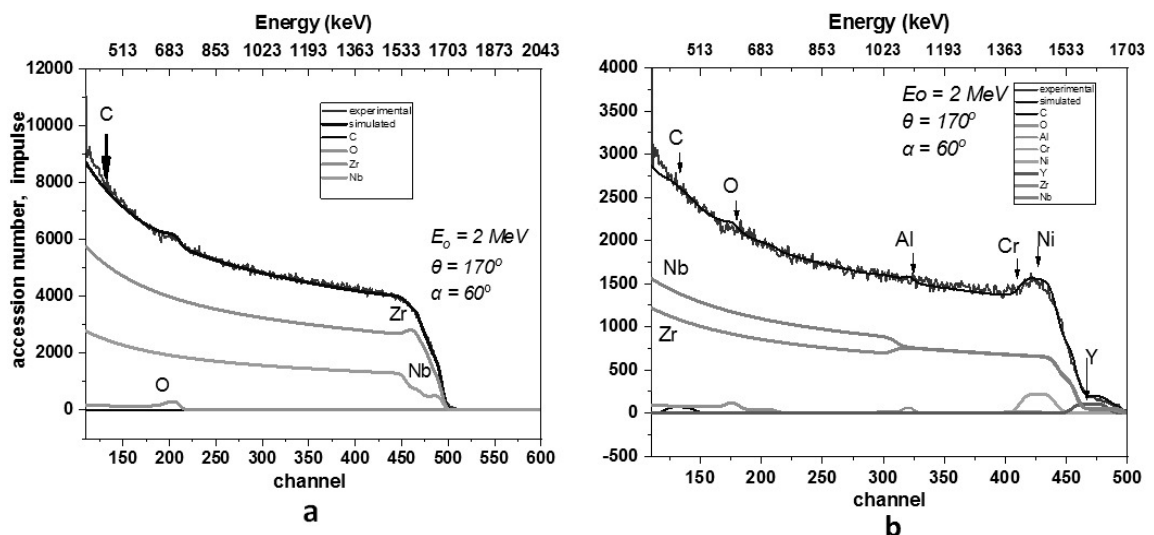


Figure 2 Energy spectra of RBS samples: a) flat b) cylindrical.

Thus, the spectral analysis showed the possibility of studying cylindrical samples with a modified structural phase state of the surface of cylindrical samples by the RBS method.

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