Materials Research by Elastic Scattering Analysis

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Several complementary techniques have been developed for surface analysis of materials. Nuclear techniques, using low energy MeV ion beams, give absolute values of concentrations of isotopes and elements for a few microns close to the surface. Their main applications have been given in areas such as scientific, technologic, industry, arts, archaeology and medicine [1-7]. Tracing of isotopes with high sensitivities is possible by nuclear reactions.The energy analysis method is used for ion-ion reactions. At a suitable bombarding energy, an energy spectrum is recorded of ions from reaction events occurring at several depths in the target. Such spectra are computer predicted and compared to data, providing target composition and concentration profile information [4-7]. Elastic scattering is a particular and important case of nuclear reactions. A computer program has been developed in this context, mainly for flat targets [4-6]. The non-flat target case arises as an extension. Elastic scattering of α particles was used for analysis. Experimental details are available [4]. The simulations used published nuclear data, namely for stopping power. Rutherford differential cross section was used when appropriate. Very good computed fits were reached to α spectra obtained from both thin and thick targets containing Al and O. Elastic scattering, as a nuclear technique, has shown to be a powerful non-destructive surface analysis analytical tool.

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