V. A. Trapeznikov. *Investigation of the surface layers of solids by electron spectroscopy.* The sometimes decisive influence of the surfaces and surface states of solids on electron structure and mechanical properties are discussed. The author reviews the results of classical work on the decrease in the strength of sodium chloride crystals that results from friction on their outer surfaces (A. F. Ioffe), on intergranular internal adsorption of impurities on internal interfaces in steels (V. I. Arkharov), and on determination of the intrinsic surface states responsible for the finite dimensions of test specimens (I. E. Tamm). Electron-spectroscopic studies (including original papers) of the external and internal surfaces of metals and semiconductors are reviewed.[1]

Studies of outer surfaces of amorphous and crystalline silicon have indicated a significant difference between the distributions of the states in the valence band,[2] and an electron line with an energy of 32 eV appears in alloys of iron with carbon, chromium and impurities in the amorphous state, although it is absent in the crystalline state.[3] Studies of the composition and oxidation depth of tungsten-powder surface layers are reported.[4] Examples of analysis of ultrathin surface layers on nickel, zirconium, niobium, palladium, steel, and thermionic-electronics elements are presented in comparison with other methods of nondestructive external-surface quality control.[5]

Studies of internal interfaces (grain boundaries, interphase boundaries, intermediate layers between platings and bases) are represented by several papers on x-ray-electron and Auger spectroscopic studies of fracture surfaces produced by temper brittleness and stony fracture in steel.[6] Data on the composition, structure, and properties of the transitional layer between a chromium plating and steel and on the nature of the adhesion of copper to aluminum oxide[7] in the aging of aluminum alloys are given.

Advances in the development of electron spectrometers,[8] procedures, and accessories for treatment of specimens in the spectrometer vacuum (mechanical[9] and ionic[10] cleaning, fracturing specimens, and cooling them to nitrogen temperatures) are reported. The latter opens the way to study of biological specimens. The first studies of dried and frozen blood indicate significant changes in the intensities and positions of the electron lines of carbon, nitrogen, and oxygen between young and old and between sick and healthy humans.

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