CONVERSION ELECTRON SPECTROSCOPY (CES) AS THE PROBING METHOD OF THE LOCAL ELECTRON STRUCTURE OF THE IMPURITY ATOMS IN SOLIDS RESULTS FOR THE Tc-99m ATOMS INTO TECHNETIUM, PLATINUM AND GOLD

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For the theoretical electron band structure calculations of the impurity systems, a direct experimental testing is impossible in detail because of the unsufficient sensitivity of the using experimental methods the same as X-ray emission spectroscopy, X-ray and ultraviolet photoelectron spectroscopies and other (see, for example, [1]). The conversion electron spectroscopy method is a suitable tool for studing the local density of the valence band electrons of an impurity atoms [2 - 4]. The principal features of the method are the localization of the conversion process in a small vicinity around the nucleus and the sharp isolation of the contribution of states with fixed angular moments to the conversion spectrum. The important properties of CES are the using of the tagged atom techniques, and the sensitivity to the chemical state of the specific type of atoms (tracers), and high absolute and relative sensitivities to small amounts of tracers. In the present work the influence of the chemical environment on spectrum of the conversion electrons of the ^{99m}Tc $E3$-transition with energy about 2.17 keV was investigated for the ^{99m}Tc atoms into technetium, platinum and gold solid matrices.

The basic equipments were the HP 5950 A double-focusing electrostatic X-ray electron spectrometer made by "Hewlett-Packard" and analogous RPS-2 spectrometer made in Russia. The energy resolution of instruments was equal to about 1 eV. The sources of the conversion electrons were prepared by the electrolysis method. The X-ray photoelectron spectroscopy (XPS) method was used for monitoring of the chemical state of sources. To eliminate the substantial influence of the oxygen contamination on CES spectra, the measurements were carried out on samples heated to $T > 300^{o}C$.