

**SURFACE CHEMISTRY OF THE PARTICLES OF SAMPLE 74220:
MANY-ELECTRON EFFECTS IN THE STRUCTURE OF ESCA SPECTRA**

Yu.P.Dikov^{*}; O.A.Bogatikov^{*}; and A.V.Ivanov[†] *Inst. Ore Deposit Geology, Petrography, Mineralogy, and Geochemistry; [†]V.I.Vernadsky Inst. Geochemistry and Analytical Chemistry; USSR Academy of Sciences, Moscow, USSR

The many-electron interactions are very informative for structure-chemical parameters of atoms /1-5/. We have studied these effects in the interval up to 40.0 eV at the side of high binding energies from the principal lines of elements for the surface layers (down to depth near 150 Å) of the particles of sample 74220. Within studied layers monotonous increase from the surface into the depth of the F content and decrease of the S content is observed. The below mentioned features of the spectra are to a great deal connected with these features of the chemistry of particle surface.

For 2p electrons Zn (fig.1) is clearly stated the presence of "shake-up" satellites within the distance of 10.5 and 14.0 eV from the principal line. The first of them is characteristic for ZnS /1/, the second one for ZnF /2/. Intensity of the first ("ZnS") satellite decrease monotonously together with the depth synchronously with decrease of the S content. In the spectra 2p electrons Ti is also discovered well-developed "shake-up" structure of the satellite (fig.2) at the distance of 13.5 eV that is typical for the oxygen compounds of Ti⁴⁺ /3/. That structure is stable along the whole studied depth. The satellite structure of the spectra 2p Ca is very complicated and mobile /fig.3/. Here the features connected mostly with Ca-O interactions in silicates (low-energetic part of spectra) reveal themselves as well as Ca-F interactions (high-energetic part) /4,5/. The intensity of Ca-F interactions increases stably with the depth.

The findings allow to suppose the mechanism of the falling-out of the attained by condensation material from endogenous gas cloud on the surface of silicate globules. Considering for the first approximation the cloud to be homogeneous concerning

to composition and temperature and overheated with respect to the silicate particles, it may be affirmed that the condensation of substance went according to the row of volatility: on the first turn condensed fluorides of metals (e.g., ZnF_2), later the sulphides. Along with that took place a partial interaction of higher temperature fluoride part of condensate with the silicate underlayer, what brought to appearance of calcium fluorides. Titanium as a more inert component had not such changes.

REFERENCES (1) Frost D.C. et al. (1976) Chem.Phys.Lett., 40, 1, 189-194. (2) Rosencwaig A. et al. (1971) Phys.Rev.Lett., 27, 8, 479-481. (3) Hedge M.S. et al. (1982) J.Electr.Spectros. 25, 2, 231-236. (4) de Boer D.K.G. et al. (1984) Phys.Rev., B, 29, 8, 4401-4419. (5) Rubloff G.W. (1972) Phys.Rev., B, 5, 2, 662-674.

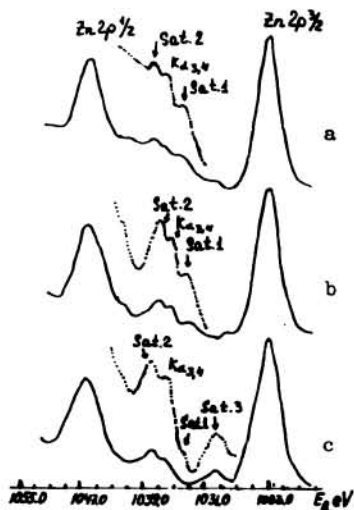


Fig.1. Zn 2p spectra of 74220
Satellite 1 from Zn-S bonds
Satellite 2 from Zn-F bonds
Satellite 3 from Zn-O bonds
(in silicate ?)

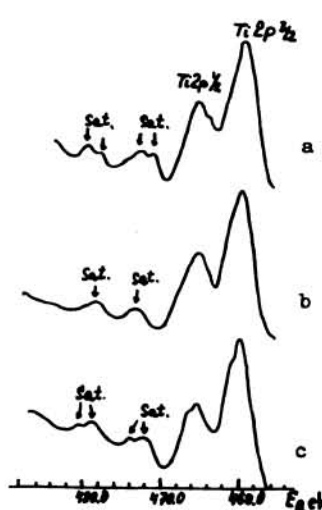


Fig.2. Ti 2p spectra of 74220
Satellites from Ti-O bonds

a - surface, b - depth
100 Å, c - depth 150 Å

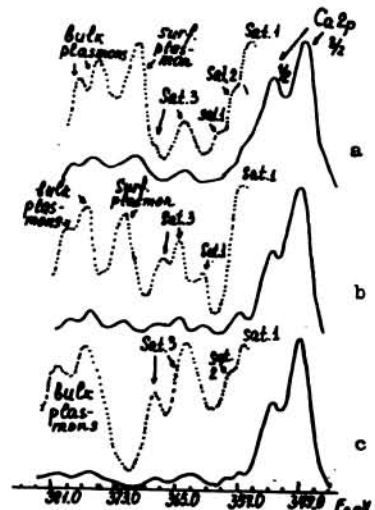


Fig.3. Ca 2p spectra of 74220
Satellites 1 and 2 from
Ca-O bonds
Satellites 3 from Ca-F bonds