Thematic area: Nanoscale physics

Electron probe-induced soliton-like moving lines on electron spectra for nanostructured surfaces: probable mechanisms

Mishchuk O.A.[1], **Lyashenko M.I.**[2]

[1] *Tribology and Surface Chemistry Laboratory, Ukrainian Scientific and Research Institute for Crude Oil Refining Industry "MASMA", 46, Palladin Av., 03142 Kyiv, Ukraine. E-mail: mishchuk@masma.ua*

[2] *Department of Radiophysics and Electronics and Computer Systems, Taras Shevchenko National University of Kyiv, 60 Volodymyrska Str., 01601 Kyiv, Ukraine.*

For different non-equilibrium objects of electron spectroscopy we may be seeing a long-term dynamic feature in secondary electron distributions [1]. It appears on electron spectra as a soliton-like moving line (ML) or a complex of a few ones with a similar dynamics (Fig.). Generally, the physical nature of MLs remains debatable, and their prognostication is still problematic today.

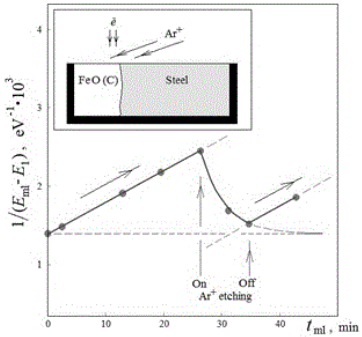

Fig. A dynamics of the large-intensity soliton-like ML in coordinates for linear approximation [1] for the native inner interface within steel surface layers between FeO(C) surface oxide and a bulk material (see the insert). Ar-ion etching causes the returning of the ML back to the initial spectral position.

The new results of experimental investigations by the methods of scanning electron microscopy and Auger electron spectroscopy (Fig.) and theoretical considerations reflect the effect of interatomic shifting of the discrete electron stages for ionized interfaces at summary impacts of an electron probe and changeable locally induced electrical charges in nearest surface layers. This effect is linked spatially and in time with the spontaneous processes of a new surface producing in the interface.

1. *Mishchuk O. A.* The moving lines on electron spectra as charge reflexes on non-equilibrium states of nanostructured surfaces // Nanoscale Research Letters.-2016.-11:202. DOI 10.1186/s11671-016-1395-8.