Resonant electron emission within moveable energy-range from changeable interfaces: Soliton-like nanoreality

O.A. Mishchuk

Tribology and Surface Chemistry Lab of Scientific and Research Inst. "MASMA" for Ministry of Energy and Coal Industry of Ukraine
46 Palladin Av., 03142 Kyiv, Ukraine.
E-mail: mishchuk@masma.ua

The long-term intensive line-like moving features on electron-induced emission spectra, the main regularities of which were illustrate earlier [1, 2] are studied further. So, for the non-stable-interface nanolayers such a moving line (ML) may be continuously displaced along an energy scale of Auger spectrum with a soliton-like complex shape (Figure) in a wide range of several hundred electron-volts. Nevertheless the nature of some atomic clusters, which predictably are responsible for the ML phenomenon, is determined. An energy-scale delimitation of the ML displacements finds the specific borders that allow at the first time to conclude about kinetic Coster-Kronig origin of MLs and about the role of resonant intermediate (inter)atomic levels *V** which have understand as similar from Liefeld *et al*. [3] and the later. A necessity of the Jahn-Teller effects in interfaces [2] for the ML revelation is also discussed.

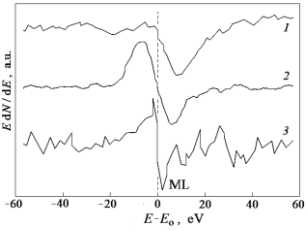

Fig. The long-term ML shapes in differential spectral mode registered for three different clusters: (*1*) abnormal emission K$L_1V^*M_{23}$ moving line from charged potassium intercalated graphite nanolayers; (*2*) Fe$L_1V^*M_{45}$ line for carbon-rich nanolayers near the steel fatigue crack at its germination state; and (*3*) Cu$L_2V^*M_{23}$ line from diatomic Bi cover at the germinal grain-boundary in Bi-2223 oxide ceramics.

1. *Mishchuk O.A.* The moving lines on electron spectra as charge reflexes on non-equilibrium states of nanostructured surfaces // Nanoscale Research Letters. – 2016. – V. 11, No. 1. – P. 202 (1-14). – doi: 10.1186/s11671-016-1395-8.

2. *Mishchuk O.A., and Lyashenko M.I.* Electron probe-induced soliton-like moving lines on electron spectra: Probable mechanisms / In: Abs. NANO-2016 Int. conf., Lviv, Ukraine, Aug. 24-27, 2016. – Lviv: Eurosvit, 2016. – P. 549.

3. *Hanzeley S., and Liefeld R.J*. An *L*-series x-ray spectroscopic study of the valence bands in iron, cobalt, nickel, copper, and zinc / In: Elem. density of states: Select. proc. of 3rd Mater. Res. symp., Gaithersburg, Maryland, Nov. 3-6, 1969. – Nat. Bur. Stand. Spe. Publ. No. 323. – Washington: US GPO, 1971. – P. 319-327.