

## **On the Oxygen and its Vacancies Diffusion in Proximity to Abrikosov Magnetic Vortices Cores in YBCO Thin Films**

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The superconducting properties of YBCO thin films under exposure to electron radiation with energy  $2 \times 10^4 \text{ eV}$  in magnetic field of  $3 \times 10^2 \text{ G}$  at temperature of  $T=77\text{K}$  are researched. The nonequilibrium distribution of atoms of oxygen, originating at electron radiation, reduces in a change of dependence of the complex magnetic susceptibility of YBCO thin films on the temperature. The diffusion relaxation of a none equilibrium distribution of oxygen and its vacancies in YBCO thin film at electron radiation, results in an appearance of new pinning centers in proximity to normal phase of Abrikosov magnetic vortices cores. The process is accompanied by an increase of both the Abrikosov magnetic vortices pinning forces and the density of critical current in YBCO thin films, influencing the magnetic susceptibility of YBCO thin films. The proposed theoretical mechanism of experimentally observed oxygen and its vacancies diffusion at gradient of a superconducting electron pair potential in proximity to Abrikosov magnetic vortices cores, may explain the observed physical properties of YBCO thin films.<sup>1</sup>

<sup>1</sup>V.O. Ledenyov, D.O. Ledenyov, O. P. Ledenyov, Features of Oxygen and its Vacancies Diffusion in YBCO Thin Films near to Magnetic Quantum Lines, Problems of Atomic Science and Technology, ISSN 1562-6016, **15**(1), 76-82 (2006).