Ostwald ripening of nanocrystals in 2D- and 3D- systems

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Currently, the products of nanotechnology (NT) are widely used in electronics, optoelectronics, information technology, medicine, biology, pharmacology, etc. [1]. Especially important is the role of NT for optical industry and, in particular, in the production of light-emitting elements. The perspective branch are the semiconductor light emitting diodes (OLED), as well as new methods of lithography (DUV and EUV).

The comparison of Chakraverti-Wagner distribution [2] and Generalized-Lifshitz-Slezov-Wagner distribution [3] was carried out within modified for the surface (2D- system) and for the volume (3D- system) of LSW theory with the experimental histograms of nanocrystals (quantum dots) obtained with different technologies - electron-beam (molecular beam) epitaxy, liquid phase epitaxy and colloidal chemistry. Matching of experimental histograms with theoretically calculated curves indicates the possibility of nanocrystal growth (dissolution) at the stage of Ostwald ripening simultaneously by two mechanisms - diffusion and chemical reaction which are controlled accordingly by diffusion coefficients D_s (D_v) and kinetic coefficient β. The results of the studies on the mechanisms of nanocrystal growth at the stage of Ostwald ripening might be used in technological processes of their synthesis.

2. *Hartmann U.*, Faszination Nanotechnologie. – München; Heidelberg: Elsevier, Spektrum, Akad. Verl., – 2006. VIII, – 166 p.
3. Vengrenovich R. D., Ivans'kyi B. V., Moskalyuk A. V. Generalized Chakraverty-Wagner Distribution / // Ukranian Journal of Physics. – 2008. – Vol. 11. – P. 1101-1109.
4. Vengrenovich R.D., Ivanskii B.V., Moskalyuk A.V. Generalized Lifshitz-Slyozov-Wagner distribution // JETP. – 2007, – Vol. 131, №6, – P. 1040-1047.