# Features of Optical Properties of CdSe with Quantum-Size Surface

Slyotov M.M., Slyotov O.M.

*Yu.Fedkovych Chernivtsi National University, Chernivtsi, Ukraine*

Cadmium selenide is one of the most important semiconductors in various functional electronics devices. Their main physical and technical parameters are mainly determined by the state of the surface. Therefore an actual task is both surface modifications with the aim of the state improvement and research of optical processes that provides the possibility of creation of various solid-state electronics devices.

Undertaken studies have shown promising chemical treatment of surface at certain temperatures, etchants compositions and time conditions. Basic cadmium selenide crystals were obtained by Bridgman method. Investigation of their optical, photoluminescent (PL) and photovoltaic (PV) properties using classical methods and λ-modulation revealed a characteristic hexagonal lattice band structure, efficient photoluminescence and photosensitivity. Their spectral characteristics are in a good agreement with well known parameters for CdSe. Chemical treatment allows to significantly changing them. A substantial increase of effective processes is observed in the short-wave region $\lambda < 0{,}7$ μm up to 0,31 μm, Fig. 1. In this case, the mirror surface of substrates is changed.

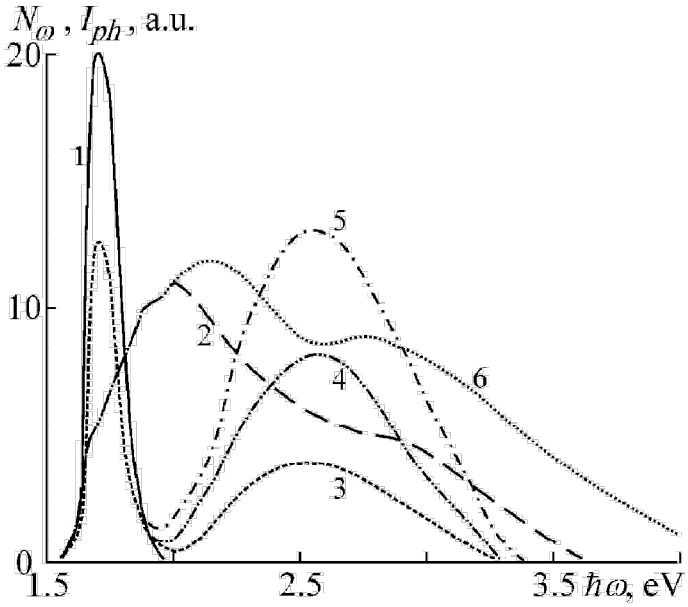


Fig. 1 PL spectra (1, 3, 4, 5) and photosensitivity (2, 6) basic (1, 2) and modified (3, 4, 5, 6) layers of CdSe

Investigations of microrelief by atomic force microscopy revealed the formation of rough surface with square roughness of the surface of 45 nm. In the PL spectra wide band in the energy photons $\hbar\omega > E_g$ is observed, which is typical for the quantum-size structures. Its intensity depends from the treatment process that indicates the possibility of controlling the intensity of short-wave radiation. Also varies the photosensitivity of surface-barrier diodes formed on CdSe, which is characterized by a shift of the maximum in a short-wave region with the spectrum expansion, including $\hbar\omega \sim 4{,}25$ eV.