

THERMAL GENESIS OF THE BOTTOM  
OF MAIN ELECTRON'S ENERGY BAND  
IN A FLAT NANOFILM

*M.V. Tkach, V.M. Kramar*

Yu. Fed'kovych Chernivtsi National University  
(2, Kotsyubynsky Str., Chernivtsi 58012, Ukraine;  
e-mail: kramar@itf.cv.ua)

S u m m a r y

In the approximation of a dielectric continuum for phonons and in the approximation of rectangular potentials and effective masses for electrons, the analytic calculation of a position of the bottom of the main electron's energy band renormed by phonons in a plane quantum well (a semiconductor film) placed in the external semiconductor medium is carried out by the Green's function method. By the example of a plane nanoheterosystem  $\beta$ -HgS/ $\beta$ -CdS, the shift of the electron's band bottom as a function of both the film thickness and the temperature is numerically calculated. It is shown that, as the temperature grows, the electron-phonon interaction in the processes of absorption and emission leads to a shift of the band bottom to the region of lower energies. The mechanisms of the increase in the shift with the temperature in films with various thicknesses, as well as the reasons for different shift rates of the electron's band bottom with increase in the temperature, are established.