EXCITONIC RESONANCE SPECTRA IN QW AND QD $In_{0.3}Ga_{0.7}As/GaAs$ HETROSTRUCTURES

A. Dorogan[2], V. Dorogan[2], A. Mereuta[1], A. Syrbu[1],
N. Syrbu[2], T. Vieru[2], V. Ursaki[3], V. Zalamai[3]

[1]*Swiss Federal Institute of Technology in Lausanne, Lausanne, Switzerland*
[2] *Technical University of Moldova, Kishinev, Moldova*
[3]*Institute of Applied Physics, Academy of Sciences of Moldova, Kishinev, Moldova*
E-mail: syrbunn@yahoo.com

The measurement of optical reflection and transmittance spectra had been carried out using МДР-2, JASCO-670 and СДЛ-1 spectrometers at 10K and 300K for S- and P-polarizations and different light angles incident on the *$In_{0,3}Ga_{0,7}As/GaAs$* heterostructure's surface with quantum wells (QW). The samples' cooling had been made in a optical cryogenic system of a locked cycle LTS-22-S-330 Workhorse. Lines conditioned by the hh,lh1-e1(1s,2s,3s), hh2,lh2 -e2(1s,2s,3s), hh1,lh1-e2(1s), and hh3,lh3,-e3(1s) transitions and particularities, conditioned by the quantum dots (QD) formed at the boundary of nanolayers and buffer layer, had been revealed in reflection, transmittance and luminescence spectra (fig. 1).

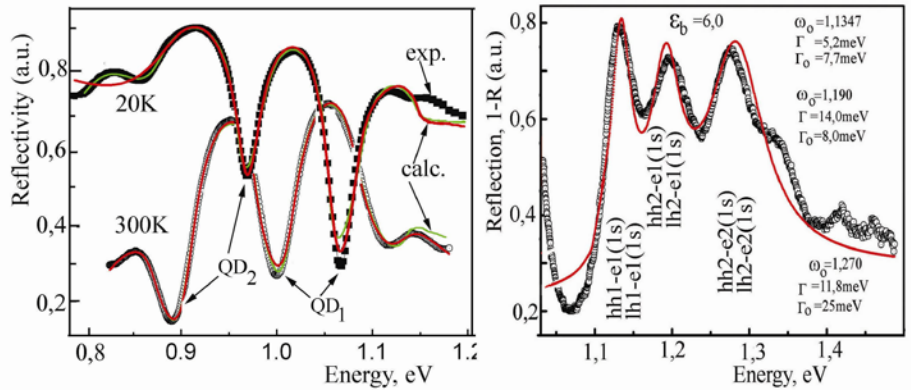

Fig.1. *Reflection spectra shapes at 300 and 20K temperature measured experimentally (exp.) and calculated using the dispersion dependencies (cal.).*

The calculations of reflection and transmittance lines in a single oscillator model of Kramers – Kronig correlations and integrals showed, that the value of background dielectric constant near the (beginning) of transitions to ground and excited states of excitons are different for QW. The exciton binding energy hh-e1, lh1-e1, effective masses m_{hh}^* and m_{lh}^* and the damping factor had been determined for the optical transitions in QW and QD. The damping factor's value is linked with the lifetime of charge carriers for the certain QD center or QW levels [1]. The damping factors for QD_1-QD_4 and excitonic levels of QW do not essentially differ. The excitons' emission lifetime in QD and of excitons in QW changes in the limits $\tau_o = (2\Gamma_0)^{-1} \cong 0.04$ -0.1ps for the studied sample.

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[1] E.L. Ivchenko. *Optical spectroscopy of semiconductor* nanostructures. Alpha Science International, Harrow, UK, (2005).