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## -Abstracts-

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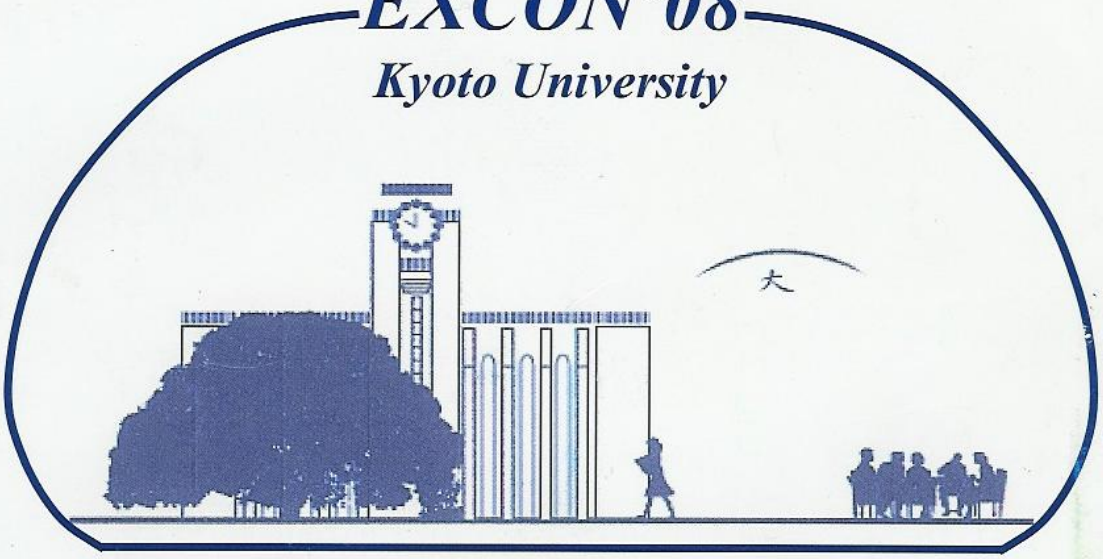

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# Exciton Quantum confinement effect in nanohills formed on a surface of CdZnTe crystal by Nd:YAG laser radiation

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The investigation of interaction of laser radiation with ternary semiconductors CdZnTe crystal is perspective direction in semiconductor physics and in nano-electronics technology. In this study possibility for formation of nanohills on a surface of CdZnTe crystal with graded band-gap by laser radiation is shown.

The change of optical properties and surface morphology at the surface layer of $Cd_{0.9}Zn_{0.1}Te$ crystal by laser radiation with the aim to create graded band-gap was investigated. Q-switched Nd:YAG laser operating at wavelength $\lambda$=0.532 μm, pulse duration $\tau$=10 ns, and intensity of laser radiation I = 7.0 - 20.0 MW/cm$^2$ was used as radiation source. The methods of photoluminescence (PL) and atomic force microscope (AFM) were used in the experiments. On the surface of the semiconductor crystal the nanohills were formed after laser irradiation at intensity of I ≈ 9 MW/cm$^2$. As the result the $A^0X$ line starts to shift in the direction of high energy - "blue shift" in PL spectrum. The shift of $A^0X$ line is $\Delta E$ = 7.7 meV at laser intensity I = 20 MW/см$^2$. The moving of exciton line $A^0X$ is explained by exciton quantum confinement effect into nanohills formed on the semiconductor surface. The graded band-gap structure with optical window is formed on nanohills' tops. AFM study has shown that the change of surface morphology does not take place after laser irradiation with intensity less than 9 MW/cm$^2$. Earlier [1] the opposite result was found. The shift of $A^0X$ exciton line toward the low photon energy - "red shift" in crystal of $Cd_{0.94}Zn_{0.06}Te$ after laser irradiation at intensity I = 0.2 - 2.0 MW/cm$^2$ was observed. This effect has been explained by Thermogradient effect.

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References

1. A. Medvid', L. Fedorenko, B. Korbutjak, S. Kryluk, M. Yusupov, A. Mychko, Radiation Measurements. **42**, 701 (2007).