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Photoluminescence of $Pb_{1-X}Cd_XJ_2$ alloys –new radiation detector materials YURIY GNATENKO, IGOR BEYNIK, PAVLO SKUBENKO, Institute of Physics of NASU — It is well known that lead iodide (PbJ_2) crystals are promising materials for radiation detectors operating at room temperature. In this paper we are reporting the first study of photoluminescence (PL) spectra of 2H-$Pb_{1-X}Cd_xJ_2$ (X=0.02 – 0.40) alloys. It was shown that for 2H-PbJ_2 PL line of free excitons corresponds to E=2.497 eV. Other exciton line at E=2.492 eV is assigned to bound excitons. The most intensive PL wide structural band is near energies 2.38-243 eV which corresponds to the recombination of donor-acceptor pairs. For $Pb_{1-X}Cd_xJ_2$ crystals the exciton lines are shifted to the short-wavelength region (for X=0.10 and X=0.30 the position of bound exciton line corresponds to 2.567 eV and 2.654 eV, respectively. It indicates about the formation semiconductor alloys. Analysis of form and energy position of PL lines shown that for $X \leq 0.20$ these alloys are homogeneous. At larger value X the formation of CdJ_2 clusters in PbJ_2 crystals take place. For $X \geq 0.40$ the crystals are strongly inhomogeneous.

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