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Luminescent properties of Cu or Cr doped ZnSe single crystal and improved by codoping with Gd impurity

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Zinc selenide single crystals doped with chromium impurity are very interested due to their remarkable luminescent properties in IR spectral region. At the same time, intensity of the interested bands can not be increased by impurity concentration in the samples. Rare-earth elements have "purifying" effect consisted in amplifying optical and elimination of non-optical transition. In this work will be analyzed influence of Gd impurity on luminescent properties of doped with Cr or Cu ZnSe single crystal in vast spectral region and temperature. The "purifying" effect is observed both in visible and IR spectral regions. It gives possibility to define native defects and background impurities in the samples. New luminescent bands are registered in visible spectral region, for example, transitions to the Cu ions or to zinc vacancy. Cu ions create a green (530 nm) and a red (635 nm) band. As for Cr^{2+} ions, we obtain intense bands at 980 nm and a complex one at 2025 nm. In ZnSe samples doped with Cu+Gd mix, we have amplified existed emission bands and found intracentered transition of Cu^{2+} ion at 1700 nm. In comparison with Cr+Gd impurity mix, we have increased intensity of the 2 μm complex band. We are proposing a theory where Gd impurity has 3+ charge state and attracts in their neighbor background impurity of transition metals with 1+ charge state. Increasing concentration of transition metals in 1+ charge state we increase number of intracentered transitions of Cr or Cu ions which effect on emission intensity.

Biography

Evghenii P Goncearenco is a PhD student at the last year of study at Moldova State University. He is a member researching group of Dr. D. Nedeoglo. In 2014 he won the Government Grant of excellence, participated at course of high energy in Tajikistan (2014) and JINR – Kurchatov Institute in Russia (2012). He is coauthor of 9 papers in reputed journals and participated more than 8 different conferences (EMRS, ICL-2014, PRE'14, LUMCOS-2013, CYSENI-2013, SPO-2014 and other).

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Structural, electronic and phonon properties of Mg_2Si, Mg_2Ge and Mg_2Sn

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First principle density functional method based on pseufo potential theory is used to investigate the structural, electronic, elastic and phonon properties of Mg2X (X= Si, Ge and Sn) compounds at ambient pressure in their antiflurite structure. The calculated ground state properties such as lattice constants, bulk modulus and its pressure derivatives and the second order elastic constants agree will with the available experimental and other theoretical results. All the above mentioned compounds show, from their band structure calculation, very small indirect band gap. The linear response theory has been applied to calculate the phonon dispersion and density of states. Phonon frequencies are compared with the available Raman modes on these compounds.

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