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Mn composition dependence of indices of refraction of $Zn_{1-x}Mn_xSe$ thin films using prism coupler technique

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We have measured the dependence of the indices of refraction n on alloy composition x of $Zn_{1-x}Mn_xSe$ films grown by molecular beam epitaxy on GaAs (100) substrates for a series of alloy compositions x . The Mn compositions of the $Zn_{1-x}Mn_xSe$ thin films were determined by photoluminescence and X-ray diffraction experiments. A prism coupler technique was used to measure n and thickness of each of the thin films. On the whole, the indices of refraction n obtained by this method decrease sublinearly as increasing x showing an inverse relationship with respect to their band gaps, in spite of showing a minimum in the band gap in the region of $0 \leq x \leq 0.2$.

And, we present a calibration curve for n as a function of alloy composition x using experimental values from the prism coupler technique. It can be used to make an accurate estimate the Mn composition in the $Zn_{1-x}Mn_xSe$ alloy system if you measure the index of refraction. In addition, photoluminescence spectra and X-ray diffraction spectra will be presented in detail.