$j_z^h = \pm 3/2$. The Lorentz force in the Landau gauge description determines the positions of the Landau quantization oscillations of the electrons and holes and their distances in the frame of the magnetoexcitons. Their relative and center of mass motions are interconnected. In difference on the direct Coulomb *e-h* interaction, which gives rise to the quadratic dispersion law $\hbar^2 k^2 / 2M(B)$ with magnetic mass $M(B)$ depending on the magnetic field strength B, the exchange *e-h* Coulomb interaction gives rise to linear dispersion law known as Dirac cone $\hbar \mathrm{v}_g k$ with group velocity v_g depending on the interband dipole moment in the way: $\mathrm{v}_g \approx \left| \rho_{c-v} / l_0 \right|^2 \approx B$, where l_0 is the magnetic length.

2. The thermodynamic properties of the ideal 2D Bose gas with linear dispersion law were discussed in the Ref [1]. The critical temperature of the Bose-Einstein condensation (BEC) of the 2D magnetoexcitons is different from zero even at the infinite homogeneous surface area and following [1] is proportional to the group velocity: $T_c \square V_g \square B$. In the case of the magnetoexcitons it increases with the increasing magnetic field strength B. The new possibilities to study the BEC phenomenon of the 2D magnetoexcitons appeared. But it takes place only at the filling factors ν of the lowest Landau levels smaller than unity $(\nu < 1)$ [2].

References

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Diffraction optical elements digital recorded in nanomultilayers As_2S_3- Se

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It is well known that films of chalcogenide glasses are an appropriate material for fabrication of diffraction optical elements (DOE) which manifest high resolution and transparency in the wide range of spectrum. However, there are problems related mostly with transmission changes in the films during recording. The low diffraction efficiency of DOE after recording is increased by subsequent chemical selective etching of the surface. This is a rather complex technological step, and the wet etching may distort the quality of optical surface of DOE.

In order to overcome these limitations in the holographic recording of diffraction elements it is proposed to use the method of their creation by direct formation of a relief on the surface, i.e. eliminating the etching operation. For this aim, multilayered nanostructures (MLN) As_2S_3- Se and the polarization holography were used [1]. We are used spatial light modulator

(SLM) for computer-aided direct formation of diffraction elements.

The LC 2002 SLM from HOLOEYE was used in set-up for phase spatial modulation of laser beam at 0.532μm. The display resolution is 800(V) x 600(H) pixels and pixel pitch 32x32 μm. The files of DOE in image format were loaded and transformed to a pictures with 256 gray-scale values. The SLM provides a phase shift up to 1.8 π radians at 543 nm. The LC 2002 SLM can be used for phase (phase mostly) and amplitude modulation applications dependent on the configuration. Expanded laser beam was directed on MLN through the SLM which produces phase and polarization modulation according to diffraction element file.

Key features of the method:

- computation of computer generated holograms (CGH) from user defined images;
- generation of SLM signals representing basic optical functions such as lenses, gratings, axicon and vortex functions;
- superposition of CGH's with basic optical functions to combine functionalities.

References

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Switching effect properties on Sn-doped $Sb_{70}Te_{30}$ thin films

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Ge-Sb-Te phase-change materials in compositions close to $Ge_2Sb_2Te_5$ and doped with Sn have been proposed to improve performance of phase-change memories (PCM) [1]. In a previous work we found that $Sb_{70}Te_{30}$ thin films show a sharp fall in the electrical resistance in a narrow temperature range when heating [2]. Thus, in this work we studied the effect of the addition of tin to this composition.

Undoped and tin doped thin films ($Sn_x[Sb_{0.70}Te_{0.30}]_{100-x}$, with x = 0, 2.5, 5 and 7.5 at. %) were obtained by pulsed laser deposition (PLD) using a Nd:YAG laser (λ = 355 nm). Their electrical resistance was measured in a two-probes configuration while heating from room temperature to 650 K, at rates below 5 K/min. A sharp fall in the electrical resistance is detected within a narrow temperature range in all the samples. Both as-obtained and thermally-treated films were structurally characterized by X-ray diffraction (XRD) using Kα(Cu) radiation and Mössbauer spectroscopy.

We compare results for these compositions in terms of identified crystallization products, transformation onset temperatures, transformation temperature ranges and amorphous/crystallized electrical resistance ratio.