resulted in increase of diffraction efficiency of each of superimposed gratings in comparison with one of a single grating..

second order first order zero order

Fig. 1. Diffraction pattern from three superimposed equally oriented gratings with grating periods of 1.8 μm, 1.9 μm and 2.0 μm.

Different surface-relief diffraction structures composed of two or three equally oriented superimposed gratings were formed. Various combinations of diffracted beams were produced by such grating structures.

Effect of amorphous shell on transfer phenomena and optical properties of size-limited systems

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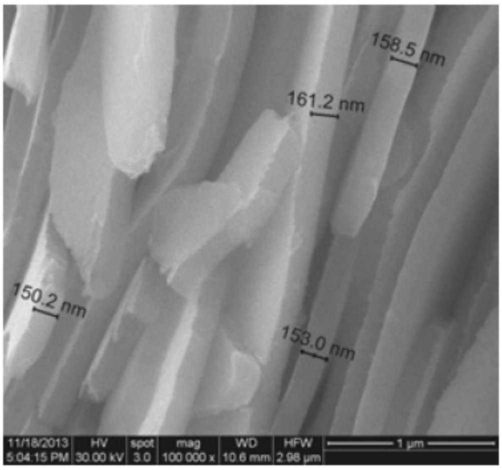
In size-quantized systems (quantum wires, quantum dots), the effect of carrier scattering on surface roughness on kinetic phenomena is especially pronounced with small nanostructures.

If a size-limited system is encased in an amorphous shell (for example, the often studied bismuth nanowire in a glass shell), then it can, in particular, due to deformation processes, significantly affect the surface of the quantum system, that is, randomly affect the size of the nanostructure. The latter circumstance has a significant effect on the kinetic processes occurring in dimensionally quantized structures without and in the presence of a shell. The influence of the shell contributes to a noticeable decrease in electrical conductivity and thermopower in nanostructures.

In an external longitudinal electric field (the electric field intensity is directed perpendicular to the axis of the quantum wire), a significant decrease in mobility with increasing intensity in a quantum system clad in an amorphous shell is possible.

The influence of the shell can manifest itself especially vividly in the case of interband and impurity absorption of an electromagnetic wave, when electrons at the optical transition fall to the bottom of the size-quantized conduction band. It is at the bottom of the quantized zones of

the one-dimensional nanostructure that features appear in the density of electronic states, whose influence on the kinetic phenomena can be consistently described taking into account carrier scattering on a rough surface. Consequently, using various types of shells, one can noticeably affect the physical properties of the nanostructures under study.



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Preparation of As_2S_3 thin layers for applications in optoelectronics

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The experimental results on the technology of As_2S_3 thin films and their characteristization using optical methods as a study of surface plasmon resonance (SPR), a light modulators that contains an amorphous As_2S_3 films as a waveguides are presented. This is due to refractive index changing when illuminated. As_2S_3 thin films were obtained by thermal evaporation in vacuum (5x10-6 Torr) from As_2S_3 powder. The conditions of vacuum thermal evaporation were chosen in such a way that the formation of atomic and molecular flows upon heating of the starting material were satisfactory. The thickness distribution are determined by shape and relative position of the source and substrate. During the deposition of As_2S_3 detailed temperature control of the evaporator and the substrate were made. To obtain high quality thin films a special evaporator was developed, which uses indirect heating.