## Nanocomposites and nanomaterials

# Nanostructures based on chalcogenide semiconductors

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The review of nanostructures based on chalcogenide semiconductors (PbS, PbSe, PbTe, SnTe, EuS. EuSe, YbS, YbSe, SrS, SrSe) is presented. It is considered the main methods of their creation, the features of their structure and properties. It was experimentally realized the different types of nanostructures: **2D (**superlattices, quantum wells), **1D (**nanowires), **0D (**quantum dots) and dislocation nanogrids.

The superconductivity has been discovered in the multilayer PbTe-PbS nanostructures [1] where there are no superconducting transitions in single-layer films. The superconductivity is connected with the presence of misfit dislocation nanogrids at the interfaces (there is no superconductivity if the dislocation nanogrids are absent).

The quantum-size effects in the nanostructures were observed by photoluminescence spectra [2-3]: the blue shifts of the emission lines are in good agreement with predictions for **2D** and **0D** quantizations.

The resonance tunneling of electrons via ferromagnetic EuS barriers was found for **2D** nanostructures. The antiferromagnetic interlayer coupling [4] of magnetic EuS layers via non-magnetic PbS, YbSe and SrS spacers has been found in semiconductor superlattices. Such coupling is observed for unusual wide range of spacer thicknesses for narrow-gap PbS semiconductor (from 0.4 nm to 40 nm), wide-gap YbSe (from 1 nm to 3 nm) and insulator SrS (from 1 nm to 2 nm).

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