

Optical properties of hybrid MoS₂ and CdTe films

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Molybdenum disulfide is due to electrical and optical properties, MoS₂ can replace silicon and even graphene in the next generation nanoelectronics devices and represents new opportunities for flexible electronics. Quantum dots cadmium telluride CdTe is the most consistent for research together with MoS₂ due to its high photo stability and long photoluminescence decay time.

In this work, we performed luminescence of two mixtures with different concentrations of MoS₂ and CdTe quantum dots by excitation with a diode laser at room temperature. The wavelength of the laser is 405 nm, and its power is 200 mV. The first solution was a dilution of MoS₂ and CdTe in a ratio of 1: 1, the second - MoS₂ and CdTe in a ratio of 1: 2. Two peaks were observed in the obtained luminescence spectra. From the analysis of the spectra, we that the first maximum is observed ~ 1.8 eV due to radiation transitions in MoS₂. the high-energy band with a maximum of about 2.1 eV is due to electronic transitions in CdTe. It turned out that the shape of the spectral dependence of photoluminescence is determined by the component composition of the mixture. Namely, as the MoS₂ content increases, the photoluminescence bands shift toward lower quantum energies due to the coupling of two-dimensional MoS₂ states and the CdTe quantum dot.

Topics

Session A. Physics of condensed matter and spectroscopy

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