Investigation of Properties Of Nanopowder ZnS:Mn, obtained by the method of selfpropagating hightemperature synthesis

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Zinc sulfide doped with various impurities is an important material for optoelectronic devices, that emitting a broad spectral range. In particular, the crystals ZnS:Cu emitting in the blue-green region of the spectrum, ZnS:Mn – in orange region and ZnS:Al – in blue.

The paper deals the results obtain nanosized ZnS powder by selfpropagating hightemperature synthesis (SHS). This method has several advantages compared with other methods of producing ZnS, since it allows to obtain a nanosized powder ZnS and produce doping directly during synthesis.

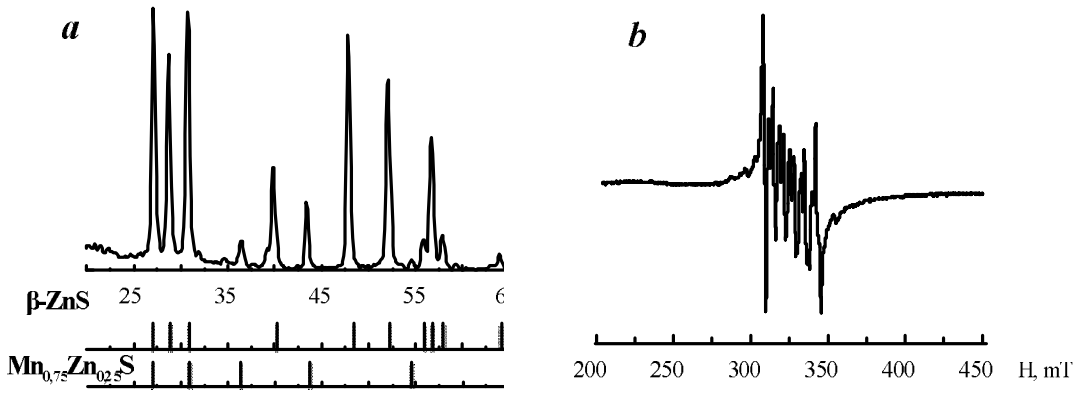

Fig. 1. Data of XR diffraction analysis (*a*) and EPR spectra nanopowder ZnS:Mn (*b*).

Fig. 1 presents the data of XR diffraction analysis and EPR spectra of powder ZnS, obtained by SHS method and doped Mn during synthesis. Preparation of ZnS nanopowder by SHS method was effected in a quartz reactor from mechanical mixture of metallic Zn and S, in the ratio 1:3. For doped ZnS ions Mn^{2+} used of $MnCl_2$ compound, in the ratio 10^{-2} gram/gram. Synthesized powder was composed mainly of hexagonal 2H (wurtzite) ZnS compounds and phase $Mn_{0.75}Zn_{0.25}S$. The contribution of the hexagonal phase is (80 ± 5)%. The average crystal size of ZnS:Mn is d ≈ (60 ± 5) nm. EPR spectrum consists of a broad line against which the prescribed six hyperfine structure lines characteristic of paramagnetic centers Mn^{2+} in ZnS. Against the background of these lines can be seen mild structure, which can also be linked to the Mn^{2+} ions in the phase of $Mn_{0.75}Zn_{0.25}S$.