EVALUATION OF THERMOCHEMICAL DATA FOR THE GROWTH OF LnP-BASED CORE-SHELL NANOSTRUCTURES

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The formation of InP-based one-dimensional core-shell nanostructures is described. The crystalline InP nanowires with the thickness of 10-50 nm served as a core, while the amorphous Ga_2O_3or $Zn_3(PO_4)_2$ layers were formed as shell materials, having the average thicknesses of 10 nm. The nanowires were grown in the hydrazine (N_2H_4) vapor diluted with 3mol.% H_2O. Analysis of chemical precursors and their possible thermochemical reactions revealed that the reactions, which lead to the spontaneous segregation of phases have highest priorities. The high negative value of a Gibbs free energy for the corresponding chemical reactions is a driving force for the separation of phases and formation of core-shell nanostructures. Besides, the kinetic factors of these reactions were qualitatively evaluated. Formation of chemically inert, nontoxic and bio-compatible $Zn_3(PO_4)_2$ shell around the InP crystalline core makes it possible to use this type of nanostructures as luminescent markers for in vitro diagnostics.