Selecting of the Diffuse Reflectance Spectra Parameters for Identification of Oxygen Containing Admixtures and the Degree of Interaction in ZnS(ZnO)–Dy$_2$S$_3$ Systems

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Possibility of identification of Dysprosium(III) compounds – oxosulfide (Dy$_2$O$_2$S), sulfide (Dy$_2$S$_3$) and oxide (Dy$_2$O$_3$) under characteristics of spectra of diffuse reflectance (position, intensity and splitting of the bands caused by 4f-4f-electronic transitions in Dy$^{3+}$ ion) in near IR-interval of a spectrum. Quantitative parameter $F(R)_{max}/F(R)_{iv}$ - the relation between intensities of the bands of reflectance corresponding to transitions $^6H_{13/2} \rightarrow ^6H_{9/2}, ^6F_{11/2}$ and $^6H_{13/2} \rightarrow ^6H_{11/2}$ – is proposed making possible detecting presence of Dysprosium oxosulfide in samples of Zinc sulfide alloyed with Dy$_2$S$_3$ which is used as sulfidizing and oxygen-removing additive. It is established that the negative deviation from additivity of values of $F(R)$ of the bands of diffuse reflectance with increase of the content of Dysprosium sulfide in samples of ZnS-n%Dy$_2$S$_3$ can serve as the interaction characteristic of admixture (ZnO) and alloying (Dy$_2$S$_3$) components in studied systems.

Keywords: zinc sulfide, dysprosium sulfide, dysprosium oxosulfide identification, diffuse reflectance spectra parameters