

EPR study of clusters of rare-earth ions in mixed fluoride crystals

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Abstract

The EPR spectra of the $(\text{BaF}_2)_{1-x}(\text{CeF}_3)_x$ system are studied for the concentrations $x = 0, 0.001, 0.002, 0.005, 0.01, \text{ and } 0.02$. The appearance of new tetragonal centers is detected beginning from $x = 0.002$, the intensity of these centers being maximal at $x = 0.01$. The $(\text{CaF}_2)_{1-x-y}(\text{CeF}_3)_x(\text{YF}_3)_y$ double solutions with $x = 0.001$ and y from 0 to 0.02 are also studied. In addition to the ordinary tetragonal center, beginning from $y = 0.001$, a new tetragonal center appears with the same structure as in the previously studied mixed crystals based on BaF_2 - namely, the Ce^{3+} - R^{3+} chain elongated along the fourfold axis substitutes the Ca^{2+} - Ca^{2+} - Ca^{2+} and Ba^{2+} - Ba^{2+} - Ba^{2+} chains in regular CaF_2 and BaF_2 crystals (is the cation vacancy, and R^{3+} is the Ce^{3+} , La^{3+} , or Y^{3+} trivalent ion). © 2014 Pleiades Publishing, Ltd.

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