

MODIFIED THEORY OF F-F TRANSITION INTENSITIES AND CRYSTAL FIELD FOR SYSTEMS WITH ANOMALOUSLY STRONG CONFIGURATION INTERACTION

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Abstract

A new theory explaining the intensity of f-f transitions and the crystal field using an approximation of a strong configuration interaction is proposed. The theory enables the anomalous influence of excited configurations with charge transfer on some multiplets of the f shell to be taken into account. With the help of this theory, a satisfactory description of the absorption transitions and luminescence branching ratios from $1 D_2$ and $3 P_0$ multiplets for the Pr^{3+} ion in double molybdates has been achieved for the first time. For further validation the theory, was used to provide a description of Stark splitting of Pr^{3+} — multiplets in elpasolites and determine the covalence parameters; these parameters were found to be in good agreement with values obtained by the other methods.

Keywords

lanthanide ions modified Judd-Ofelt theory modified theory of crystal field optical spectroscopy