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Luminescence study of Eu^{3+}-doped garnet phosphors : relating structure to emission.

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Streszczenie

A series of Eu^{3+}-doped garnets of the general formula A3B2X3O12 (A = Sr,Ca; B=Sc,Y; X = Si,Ge) was obtained using a high temperature solid state reaction. These compounds were characterized by X-ray diffraction and photoluminescence spectroscopy. The relation between the luminescence properties of phosphors and their host lattice composition was studied. It was found that Eu^{3+} ions occupied the A site in compounds with smaller cell volume (Ca3Sc2Si3O12, Ca3Sc2Ge3O12 and Sr3Sc2Ge3O12) and both A and B sites in compounds with bigger cell volume (Ca3Y2Ge3O12 and Sr3Y2Ge3O12). This study showed the relationship between the host lattice composition and the energy of the charge transfer (CT) transition, 4f→4f/CT, ^{5}D0→^{7}F2/^{5}D0→^{7}F1 and ^{5}D0→^{7}F4/^{5}D0→^{7}F1 intensity ratios and splitting of the ^{7}F1 level by the crystal field. Decay t

Słowa kluczowe

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