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Relationship between structure and luminescence properties in Ce^{3+} or Ce^{3+}, Mn^{2+} - doped garnet phosphors for use in white LEDs.

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Streszczenie

A series of Ce^{3+}or $Ce^{3+}$and Mn^{2+}doped garnets of the general formula $A_3B_2X_3O_{12}$(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 luminescence properties of phosphors and their host lattice composition was studied. It was found that Ce^{3+}ions occupied the A site and emitted in the green spectral region. Mn^{2+}ions can exchange cations in both A and B sites showing green and red emissions, respectively and getting excited due to an energy transfer from Ce^{3+}. This study showed the relationship between $Ce^{3+}$and Mn^{2+}emission/excitation wavelengths and the symmetry around the activator ions expressed by means of the distortion factor of the dodecahedral A site (d_{88}/d_{81}). Decay times of the $Ce^{3+}$and Mn^{2+}luminescence were measured and correlated with the compositional dependent structural changes.

Słowa kluczowe

Garnet structure, Germanates, luminescence

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