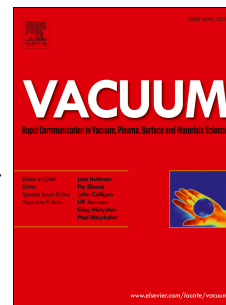


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Effects of preparation method and temperature on the cation distribution of  $\text{ZnGa}_2\text{O}_4$  spinel studied by X-ray photoelectron spectroscopy

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Effects of preparation method and temperature on the cation distribution of  $\text{ZnGa}_2\text{O}_4$  spinel  
studied by X-ray photoelectron spectroscopy

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$\text{ZnGa}_2\text{O}_4$  spinel powders were prepared by two different methods: sol-gel method (SG) and solid state reaction method (SSR). The distribution of cations ( $\text{Ga}^{3+}$ ,  $\text{Zn}^{2+}$ ) in the tetrahedral and octahedral sites in  $\text{ZnGa}_2\text{O}_4$  as a function of synthesis method and annealing temperature has been investigated by X-ray photoelectron spectroscopy. The results showed that  $\text{Ga}^{3+}$  ions were located in large proportions in the octahedral sites and in small proportions in the tetrahedral sites in all the  $\text{ZnGa}_2\text{O}_4$  powders. The inversion parameter (2 times the fraction of  $\text{Ga}^{3+}$  ions in tetrahedral sites) decreased with increasing annealing temperature. The samples prepared by SSR method showed lower inversion degree when compared with those by SG method. The change of  $\text{Zn}^{2+}$  fraction in octahedral sites is consistent with that of inversion parameter. Analysis of the emission properties indicated that  $\text{Ga}^{3+}$  ions occupied two coordination sites in the samples and changed with temperature.

**Keywords:**  $\text{ZnGa}_2\text{O}_4$  spinel; Cation distribution; X-ray photoelectron spectroscopy; Luminescence

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