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Abstract
In our previous study, we found that boehmite is a better aluminum source to synthesize yttrium aluminum garnet (YAG) powder via the solid state reaction. In this study, we further developed a novel sol-gel method to synthesis YAG phosphor powder used boehmite as the aluminum source. The comparisons of these different processes: the sol-gel method and the solid state reaction were discussed in this article. Pure YAG phase was found in the sol-gel product after calcining at 900℃ for 1 h. Whereas the product of the solid state reaction was still Y2O3 phase as calcined at 900℃ for 1 h. The calcination temperature of the solid state reaction method needs to ≧1500℃ for a long time to form pure YAG phase . According to the experimental results, we can conclude that the formation YAG phase via the novel sol-gel method is lower than that formed by the solid state reaction method.
In addition, we can obtain pure YAG phase at low temperature as adopted a novel sol-gel method, but it generated the liquid phase as calcined at 1300℃ which leads to form the impure phases : The calcination temperature of the solid state reaction method needs to ≧1500℃ for a long time YAP and CeO2, and the wavelength of this phosphors was blue shifted. The impure phase can be eliminate by addition calcination at 1200 ℃ for 1 h. The emission intensity of the product can be improved by the reducing heat treatment (in 10% H2 and 90% He) at 1300℃ or 1500℃.The emission intensity was increased by increasing the pre-treated temperature and the reducing heating temperature.
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