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Structure Formation of $SrAl_2O_4$ Synthesized by Solution Combustion Synthesis

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ABSTRACT

Strontium aluminates ($SrAl_2O_4$) powders, which are well-known matrix materials in fluorescent applications, have been synthesized by a solution combustion synthesis technology with reactants of strontium nitrate, aluminum nitrate, and urea. The phase changes of synthesized $SrAl_2O_4$ structures have been investigated to make clear the effects of reactant concentrations and preheating temperatures of solution combustion synthesis. The combustion synthesis reactions could be confirmed to occur above 870K. As a result, within the range of preheating temperatures tested between 870 K and 1270 K, monoclinic-$SrAl_2O_4$, hexagonal-$SrAl_2O_4$, $Sr_3Al_2O_6$, and $SrAl_4O_7$ could be identified. The hexagonal-$SrAl_2O_4$ existed at the tested whole temperature ranges, and the maximum ratio of monoclinic-$SrAl_2O_4$ could be found at 1270 K. At the higher temperatures, the ratio of $Sr_3Al_2O_6$ increased and that of $SrAl_4O_7$ decreased. In the case of with a urea amount 1.5 times more than the stoichiometric ratio, the ratio of monoclinic-$SrAl_2O_4$ was the maximum in the present work (more than 70% of the product). By controlling proper pre-heating temperature and urea amount, it is possible to change the phase ratio of $SrAl_2O_4$ by the present solution combustion synthesis..

Keywords: ***Solution combustion synthesis, strontium aluminates, phase transition, and long-afterglow luminescent materials.***