$La_2O_2CO_3$ phase transformation in $La_2O_2CO_3$/ZnO composite materials as a function of La/Zn ratios: The stability and crystallinity of the $La_2O_2CO_3$ phases

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$La_2O_2CO_3$/ZnO composite materials have been used as a catalyst for CO_2-involving chemical reactions and $La_2O_2CO_3$ phases are an important factor to influence on catalyst performance. In this study, we prepared $La_2O_2CO_3$/ZnO composite materials by two different methods – precipitation (PLZ) and ethylene glycol combustion (ELZ) – as functions of La/Zn ratios and calcination temperatures to investigate the formation of $La_2O_2CO_3$ phase in the composite materials. The calcination temperature was not an crucial variable to control the $La_2O_2CO_3$ phase. However, in both series of the composite materials, the $La_2O_2CO_3$ phase was changed depending on the La/Zn ratio. Consequently, the increase in the La/Zn ratio of the composite materials induced the crystallinity of $La_2O_2CO_3$ phase and the formation of hexagonal phase was preferred under the high crystalline $La_2O_2CO_3$ structure. The CO_2 release from the hexagonal structure occurred at the higher temperatures than that from the monoclinic phase, which prove that the hexagonal phase was more stable than the monoclinic.