

Synthesis, Characterization, and Catalytic Activity of Nanocrystalline $\text{La}_{1-x}\text{Eu}_x\text{FeO}_3$ during the Combustion of Toluene

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摘要 Nanostructured LaFeO_3 and substituted $\text{La}_{1-x}\text{Eu}_x\text{FeO}_3$ ($x = 0.1, 0.15, \text{ and } 0.2$) perovskites were synthesized by sol-gel auto-combustion and their activities during the combustion of toluene were evaluated. The structure and physico-chemical properties of the perovskites were characterized by X-ray diffraction, Fourier transform infrared spectroscopy, scanning electron microscopy, and BET surface area analyses. The compounds were crystallized as a perovskite phase with an orthorhombic structure. The mean particle size of the perovskites increased with an increase in europium loading while the specific surface area decreased. Characterization data confirmed that a total insertion of Eu into LaFeO_3 occurred at $x \leq 0.15$. However, Eu_2O_3 segregation occurred to some extent especially at $x > 0.15$. The catalytic activity of the catalysts increased substantially with an increase in Eu substitution in the evaluated range.

关键词: perovskite sol-gel europium volatile organic compounds catalytic oxidation

Abstract: Nanostructured LaFeO_3 and substituted $\text{La}_{1-x}\text{Eu}_x\text{FeO}_3$ ($x = 0.1, 0.15, \text{ and } 0.2$) perovskites were synthesized by sol-gel auto-combustion and their activities during the combustion of toluene were evaluated. The structure and physico-chemical properties of the perovskites were characterized by X-ray diffraction, Fourier transform infrared spectroscopy, scanning electron microscopy, and BET surface area analyses. The compounds were crystallized as a perovskite phase with an orthorhombic structure. The mean particle size of the perovskites increased with an increase in europium loading while the specific surface area decreased. Characterization data confirmed that a total insertion of Eu into LaFeO_3 occurred at $x \leq 0.15$. However, Eu_2O_3 segregation occurred to some extent especially at $x > 0.15$. The catalytic activity of the catalysts increased substantially with an increase in Eu substitution in the evaluated range.

Keywords: perovskite, sol-gel, europium, volatile organic compounds, catalytic oxidation

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