

## Synthesis of Lanthanum Silicate Oxyapatite by a New Water-based Sol-gel Process Using $\text{Na}_2\text{SiO}_3$ as the Source of Silica

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Lanthanum silicate oxyapatites [ $\text{Ln}_{10-x}(\text{XO}_4)_6\text{O}_{3-1.5x}$ ] (X=Si or Ge) have recently attracted considerable attention because of their high ion conductivity at low temperatures (700°C). They are promising candidates for SOFCs (solid oxide fuel cells) electrolyte to substitute YSZ (yttrium stabilized zirconia). The synthesis of lanthanum silicates via conventional solid-state reactions requires high temperature (>1600°C) due to the low reactivity of the reagents  $\text{La}_2\text{O}_3$  and  $\text{SiO}_2$ . Therefore, developing of a synthesis method in low temperature is an attractive research. In this paper a lanthanum silicate oxyapatite,  $\text{La}_{9.56}(\text{SiO}_4)_6\text{O}_{2.33}$ , was synthesized.  $\text{Na}_2\text{SiO}_3$  solution, derived from alkali fusion of zircon, and lanthanum nitrate were used as the source of Si and La respectively. The resulted  $\text{La}_{9.56}(\text{SiO}_4)_6\text{O}_{2.33}$  powder was compared with correspondent lanthanum silicate obtained from TEOS, the normally employed source of Si. The oxyapatite phase was observed at 900°C. Techniques such as TGA-DTA, XRD, SEM and BET were used to evaluate the two final lanthanum silicates.