

**MOLTEN SALT SYNTHESIS OF LA-NI-CO HYDROGEN STORAGE ALLOYS**

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La-Ni based alloys are being used in the commercial secondary nickel metal hydride batteries. Economical synthesis of these alloys may cause large scale utilization of them especially in the electrical vehicles. The electro-deoxidation, which is accepted as the revolutionary technique in the extractive metallurgy, is very promising in the hydrogen storage alloy synthesis since it provides direct synthesis of the alloys from their oxide raw materials. In this study A2B7 type La-Ni-Co alloys were synthesized from sintered mixture of  $\text{La}_2\text{O}_3 + \text{NiO} + \text{CoO}$  in the molten salt by the electro-deoxidation method at  $850^\circ\text{C}$  and the electrochemical hydrogen storage characteristics of the synthesized alloys were observed. Sintering resulted in formation of the non-hygroscopic  $\text{La}_2\text{NiO}_4$ ,  $\text{LaNiO}_3$ ,  $\text{La}_3\text{Ni}_2\text{O}_{6.5}$  and  $\text{La}_4\text{Ni}_3\text{O}_9$  phases depending on the Co content of the oxide mixture. The X-ray diffraction peaks indicated that  $\text{La}_2\text{NiO}_4$  was the main La-Ni-O phase to initiate the  $\text{LaNi}_5$  phase formation. The target  $\text{La}_2\text{Ni}_7$  phase formed much later than  $\text{LaNi}_5$  phase. It was observed the discharge capacities changed between  $208 \text{ mA h g}^{-1}$  ( $\text{La}_2\text{Ni}_7$ ) and  $332 \text{ mA h g}^{-1}$  ( $\text{La}_2(\text{Ni}_{0.8}\text{Co}_{0.2})_7$ ) depending on the alloy Co content. This work clearly indicated that the electro-deoxidation was very effective and probably much more economical method in the synthesis of the hydrogen storage materials.

**Keywords:** La-Ni alloys, electro-deoxidation, hydrogen storage

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