Infiltration of precursor solution in \( \text{LaCoO}_x \) is shown and secondary phase structure (Fig. 1) can be seen. The electrolyte pursuit is pivotal for understanding the structure of cathode material. This connection profoundly impacts SSB performance, including conductivity and stability. Thus, investigating these properties is crucial for optimizing SSB design. This poster delves into the electrolyte-cathode interface in SSBs, utilizing \( \text{LaCoO}_x \) as the Li-garnet electrolyte and LCO as the cathode material. Industrial implementation of SSBs is dependent on the cathode electrolyte and cathode material. One method that can improve the contact area between the electrolyte and active material without the need of high sintering temperatures is the in-situ synthesis of \( \text{LiCoO}_2 \) from nitrate precursors, whose decomposition act as a binding agent on the surface.

**CONCLUSIONS**

- Successful synthesis of cubic Nb-LLZO at 1050 °C with two heating steps.
- Successful synthesis of layered \( \text{LiCoO}_2 \) from nitrate precursors at 700 °C for 1h.
- Interfacial contact between SE and active material is improved during in situ synthesis of \( \text{LaCoO}_x \) on Nb-LLZO particles.
- When in contact with \( \text{LaCoO}_x \) at 700 °C, spinel \( \text{LCO} \) is produced instead of layered. Slight increase to 720 ºC seems to result in layered structure.
- \( \text{LiCoO}_2 \) is the side product of the heat treatment of Nb-LLZO with \( \text{LiCoO}_2 \).

**METHODS**

**Section 1:**
- Nb-LLZO precursor was prepared by roll milling stoichiometric amounts of \( \text{Li}_2\text{CO}_3, \text{La}_2\text{O}_3, \text{ZrO}_2 \), and \( \text{NiO}_2 \). 10 mol% excess Li was added. The mixture after it was dried, was pressed into pellets and heat treated in two heating steps of 2 hours each at 1050 °C in muffle furnace.
- \( \text{LiCoO}_2 \) precursor solution was prepared from stoichiometric amounts of \( \text{LiNO}_3 \) and \( \text{Co(NO}_3)_2 \) dissolved in DI. 10 mol% excess Li was added. The dried gel was crushed into powder and then pressed into pellets and heat treated in a tube furnace under 02 at 700 °C for 1h.

**Section 2:**
- 50-50 wt% of Nb-LLZO/LCO precursors mixtures were prepared by the following procedure.

**NEXT STEPS**

- Infiltration of precursor solution in Nb-LLZO scaffold to improve interfacial contact.
- Impedance measurements of symmetrical cells consisted of in situ synthesized \( \text{LiCoO}_2 \) and sintered pellets of \( \text{NiCo}_2 \).
- Construction of full cell with Li anode.

**REFERENCES**


**INTERN BIO**

Alhussain is a Penultimate year chemical engineering studying at University College London. He’s a dedicated student with a broad range of interests, from engineering and finance to research and development.