

## Defence announcement

Public Defence on 26 January 2024

# Highly active catalytic cathode and selective separator for elevated temperature lithium oxygen batteries

<b>Title of the doctoral thesis</b>	Highly active catalytic cathode and selective separator for elevated temperature lithium oxygen batteries
<b>Content of the doctoral thesis</b>	<p>The thesis focuses on design, fabrication and characterization of highly active cathode and effective separator for the lithium oxygen batteries operating elevated temperature. The main purpose of this study is to design bifunctional catalytic cathode and effective separator for lithium oxygen batteries, develop fabrication process and prove battery performance with various characterization techniques. The study includes synthesis of perovskite <math>\text{LaNi}_{0.5}\text{Co}_{0.5}\text{O}_3</math> (LNCO) cathode, metal organic frameworks (MOF) based separator, and lithium oxygen batteries operating at elevated temperature. Different synthesis methods were applied to obtain the highly active catalyst LNCO. Batteries with LNCO cathode delivered high catalytic activities toward oxygen reduction reaction and oxygen evolution reaction during battery operation. The batteries exhibited ultra-low overall overpotential and long-term stability during cycling. The MOF based separator is proven to be feasible for lithium oxygen batteries operating at elevated temperature.</p> <p>This work studies the LNCO synthesized by different method, the MOF based separator, the assembling method of lithium oxygen batteries operating elevated temperature and develop method to characterize materials and batteries. The knowledge from this work can be further used to customize catalytic cathode and effective separator for specific applications.</p>
<b>Field of the doctoral thesis</b>	Chemical engineering
<b>Doctoral candidate and contact information</b>	M.Sc. (Tech.) Qianyuan Qiu qianyuan.qiu@aalto.fi
<b>Public defence date and time</b>	26 January 2024 at 13 o'clock (in Finnish time)
<b>Remote defence</b>	<a href="https://aalto.zoom.us/j/62920950890">https://aalto.zoom.us/j/62920950890</a>
<b>Place of public defence</b>	Aalto University School of Chemical Engineering, Lecture hall Ke2 (Komppa-Sali), Kemistintie 1, (main door at Biologinkuja) Espoo
<b>Opponent(s)</b>	Professor Chuan Wang, Nanjing Technology University, China
<b>Custos</b>	Professor Yongdan Li, Aalto University School of Chemical Engineering
<b>Link to electronic thesis</b>	<a href="https://aaltodoc.aalto.fi/handle/123456789/51">https://aaltodoc.aalto.fi/handle/123456789/51</a>
<b>Keywords</b>	lithium oxygen batteries; perovskite cathode; metal-organic framework, high temperature