FACULTY OF
BIOSCIENCE ENGINEERING

The Chancellor of Ghent University has the honour of inviting you to attend the public defense of the doctoral dissertation of

ir. Guillaume Henderson

Title of the doctoral dissertation:

Electrochemical conversion of lithium salts into battery precursors
Elektrochemische conversie van lithium zouten in batterij precursoren

The public defence will take place on June 10th 2026 at 17:00 in the Academieraadzaal Azalea, room A 0.1 at Campus Coupure, Coupure Links 653, 9000 Ghent.

There will be a contiguous reception, to which you are heartily invited.
Please confirm your attendance before May 22th to: Guillaume.henderson@ugent.be

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Abstract of the doctoral research

Lithium plays a key role in the energy transition to reduce our greenhouse gas emissions to near zero levels. Its light and energy dense properties make it an ideal material to store energy in batteries that are used in mobile applications, such as portable electronics and electrical vehicles. Currently, the EU sources almost all its lithium from outside the EU and is urging to develop its own sustainable domestic supply chain. Although the EU does not have sufficient domestic natural lithium sources to meet its demand, it can play a key role in the conversion of intermediate lithium salts, such as LiCl and Li_2SO_4, into the battery precursors Li_2CO_3 and LiOH. This process is currently performed through the addition of Na_2CO_3 and $Ca(OH)_2$, but a substantial amount of greenhouse gases are emitted and salt waste is generated that requires further treatment.

Membrane electrolysis is a more sustainable alternative that converts lithium salts into LiOH. It can eliminate most greenhouse gas emissions and generate valuable byproducts instead of waste. This thesis aims to support the development of membrane electrolysis for the conversion of lithium salts and accelerate its adoption by industrial players. Different membrane electrolysis configurations were evaluated and optimized, including the chlor-alkali electrolyzer, three-compartment electrolyzer and bipolar electrodialysis, for both LiCl and Li_2SO_4 electrolytes. In addition, the effect of impurities, coming from battery recycling activities, on the electrolyzer is investigated.

Brief Curriculum Vitae

Guillaume Henderson (°Ghent, Belgium, 29/07/1997) is a PhD candidate in Bioscience engineering at Ghent University, specializing in membrane electrolysis and lithium refining. He holds a BSc and MSc in Bioscience Engineering, with a major in Environmental Technology. He obtained a Baekeland mandate from the Flemish Agency for Innovation & Entrepreneurship (VLAIO) to pursue a PhD at the Center for Microbial Ecology and Technology (CMET), in collaboration with Umicore's Corporate Research & Development Group. In 2020, Guillaume started as a project engineer, exploring electrochemical lithium conversion techniques in collaboration between UGent and Umicore.

During his PhD, Guillaume tutored three master and five bachelor students and assisted in the following courses: Resource Recovery Technology (metallurgy), Environmental technology: Wastewater and Microbial Resource Technology at two campuses (Ghent University and Global Campus South-Korea). Guillaume presented his research on the IWA MTC Conference (Daegu, South-Korea, 2025) and on the 37th topical meeting of the International Society of Electrochemistry (Stresa, Italy, 2024). He authored three A1 peer reviewed papers.