

Contaminated Water Tolerance in AEM Water Electrolysis for Lunar Applications

Topic suitable for paid Master's Thesis

Water electrolysis is a key technology for enabling a sustainable human presence on the Moon, where locally available water resources can be used to produce oxygen and hydrogen. However, lunar water is expected to contain impurities such as sulphur species and dissolved salts, which pose significant challenges for electrochemical systems and can lead to rapid degradation.

This thesis focuses on preliminary measurements of AEM electrolysis under simulated operating conditions, with particular emphasis on **lunar water analogues**. The goal is to better understand how impurities affect performance and lifetime, and to develop more robust electrodes for lunar base environments.

Work packages include:

- AEM electrode fabrication
- Electrochemical lifetime testing
- Analysis of degradation mechanisms
- Data evaluation and feedback

At the Fuel Cell & Hydrogen research group at CEET, you will join a team of experienced researchers, PhD candidates, and motivated master's students with strong expertise in materials preparation, electrochemistry, and cell characterization. The institute provides a fully equipped electrochemical laboratory with all necessary infrastructure for the planned experimental work. Furthermore, this work will be conducted in close collaboration with the company Duramea FlexCo.



Compound	% Relative to H ₂ O(g)*
H ₂ O	100.00%
H ₂ S	16.75%
NH ₃	6.03%
SO ₂	3.19%
C ₂ H ₄	3.12%
CO ₂	2.17%
CH ₃ OH	1.55%
CH ₄	0.65%
OH	0.03%



[1] Colaprete, A. *et al.* Detection of water in the LCROSS ejecta plume. *Science* **330**, 463–468 (2010). <https://doi.org/10.1126/science.1186986>