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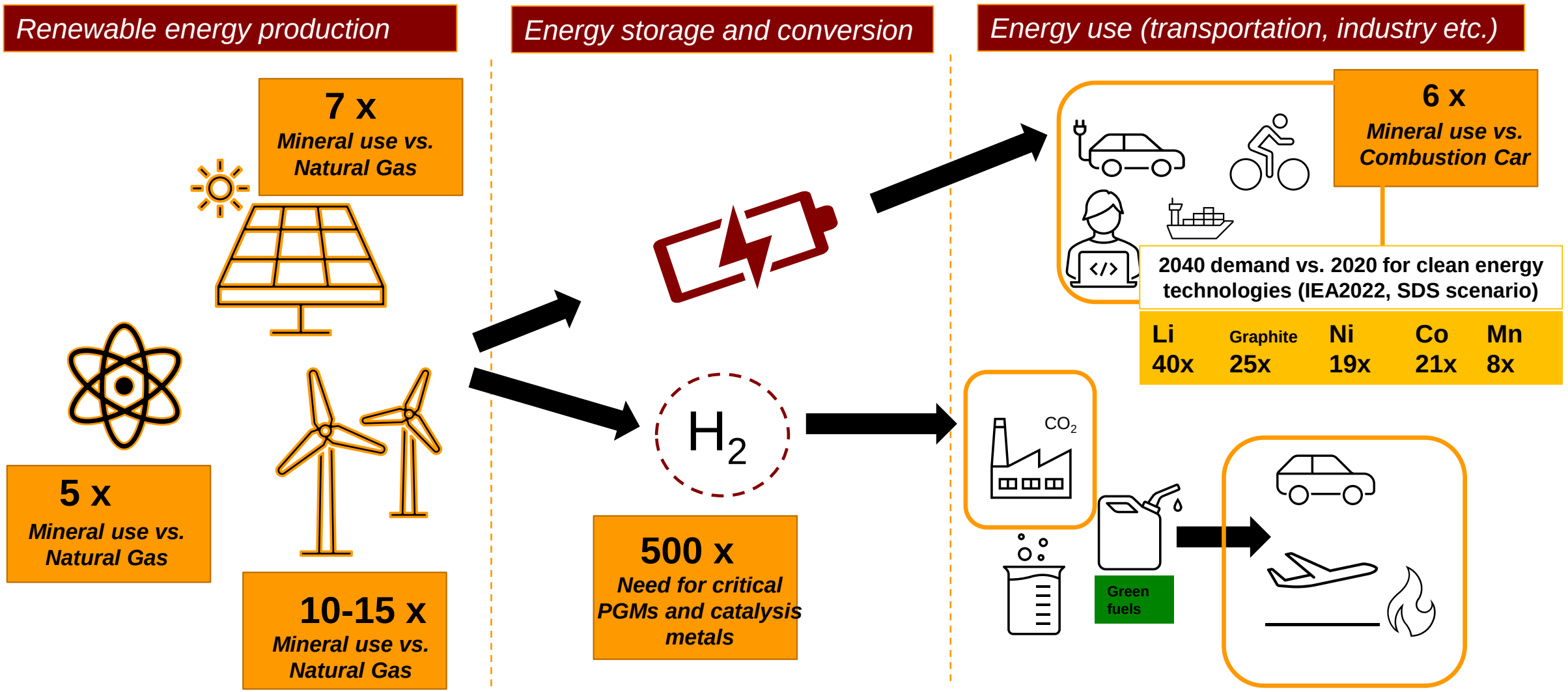
FinH2
Iridium-free PEM electrolyzer

Prof. Tanja Kallio / 28.11.2024 / VTT

Green Technologies - Ecosystem of Metals



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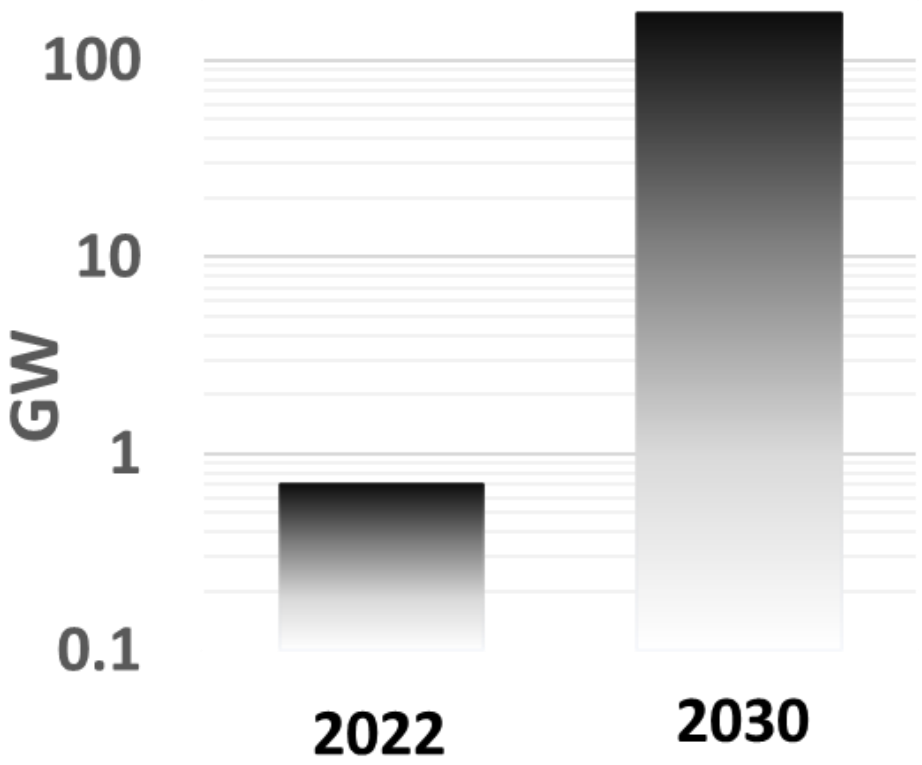
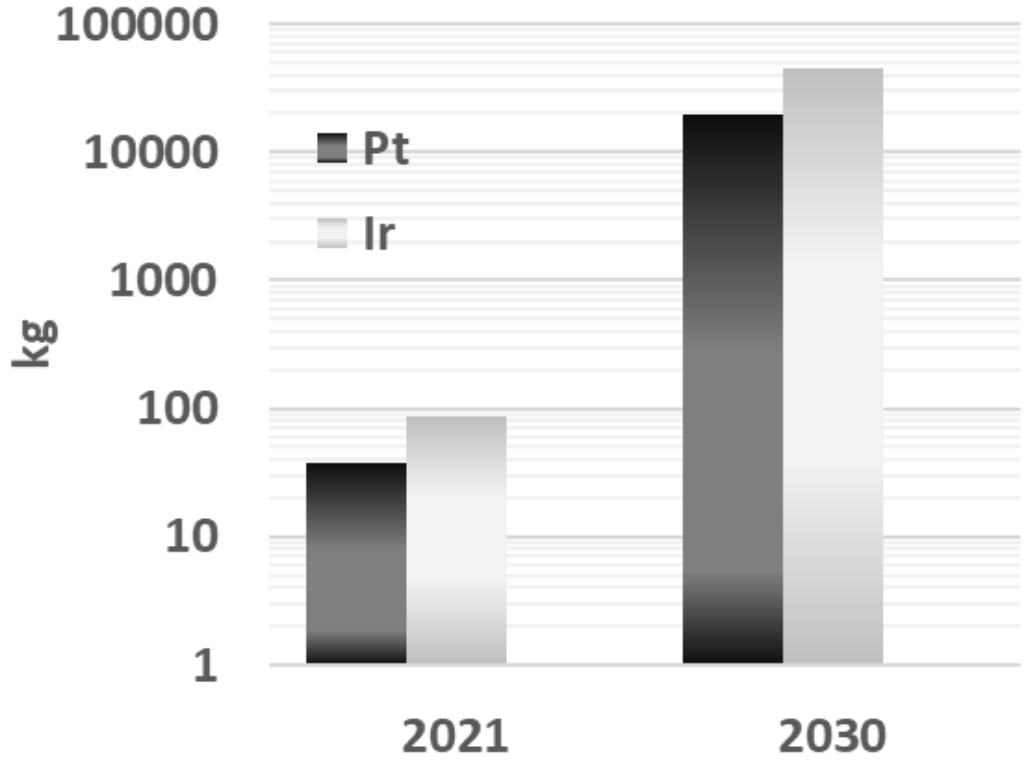
Prof. Mari Lundström (Aalto University) – Prof. Tanja Kallio

Global Electrolyzer Capacity Increase ~250 times?

PGMs demand for PEMEL increase 500 times?





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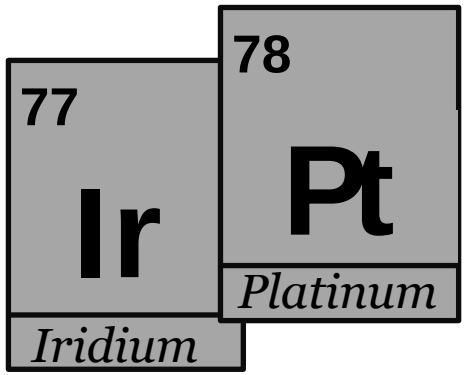
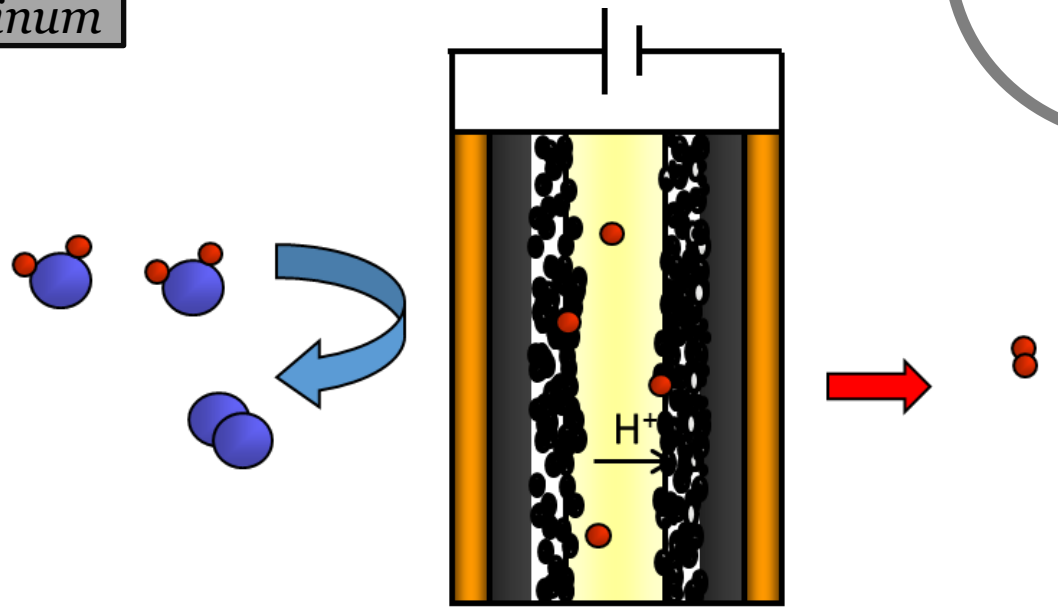
IEA: Global Hydrogen Review 2023
IEA: The Role of Critical World Energy Outlook Special Report Minerals in Clean Energy Transitions 2022

PEM electrolysers for flexible operation





high efficiency

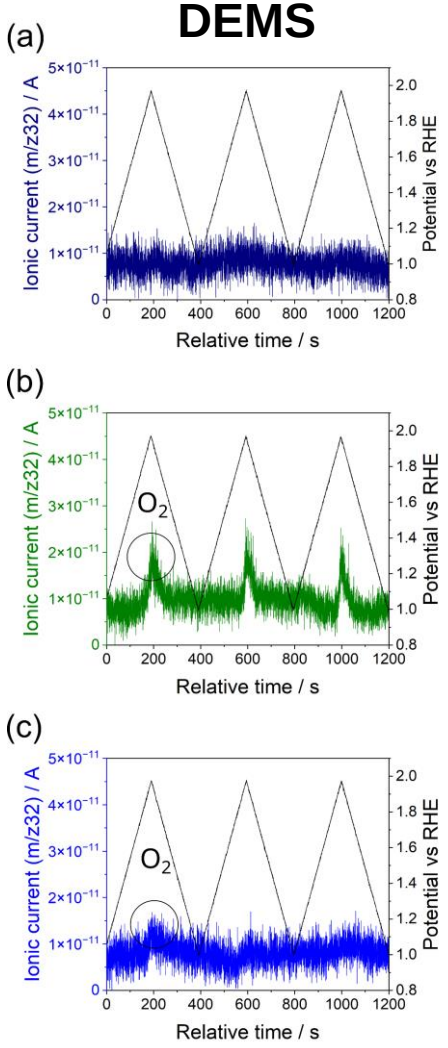
high purity H_2

low temperature

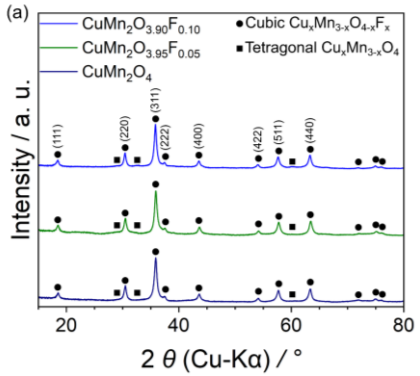
fast response time

$CuMn_2O_{4-x}F_x$ on Ti mesh

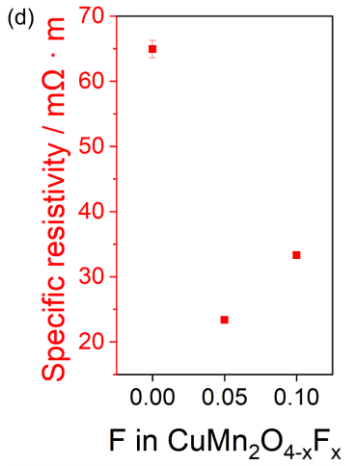
DEMS



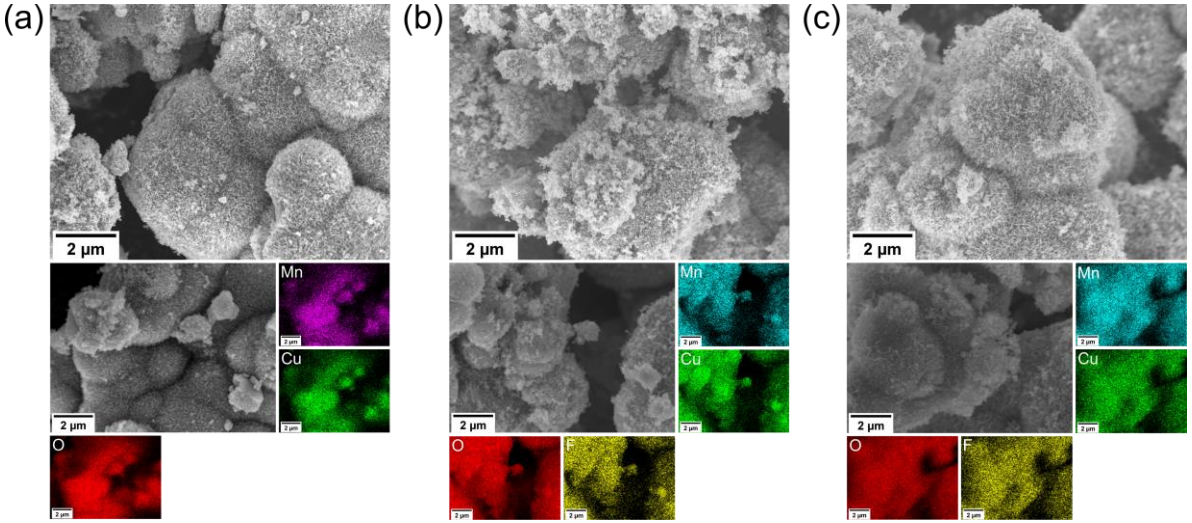
XRD



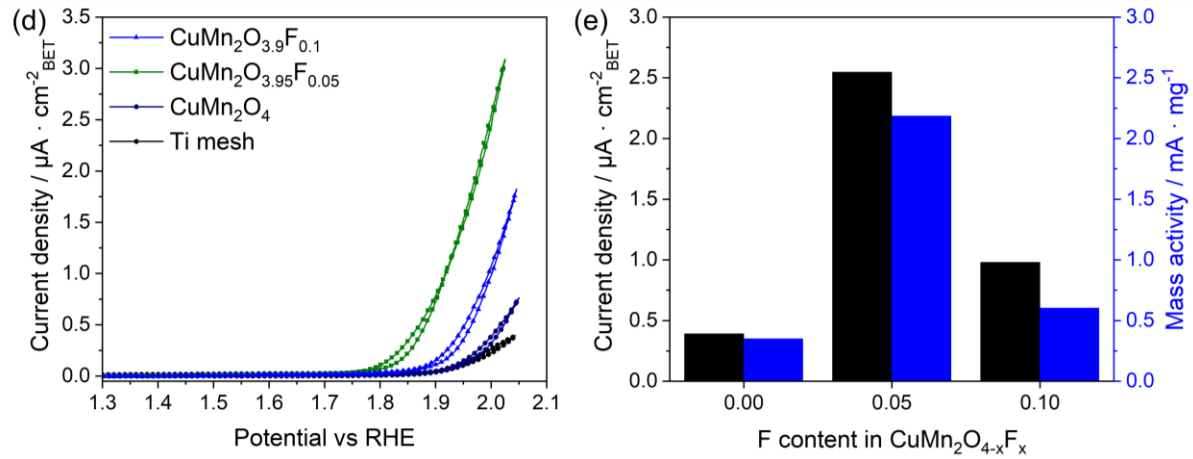
conductivity



SEM EDX



electrochemical results



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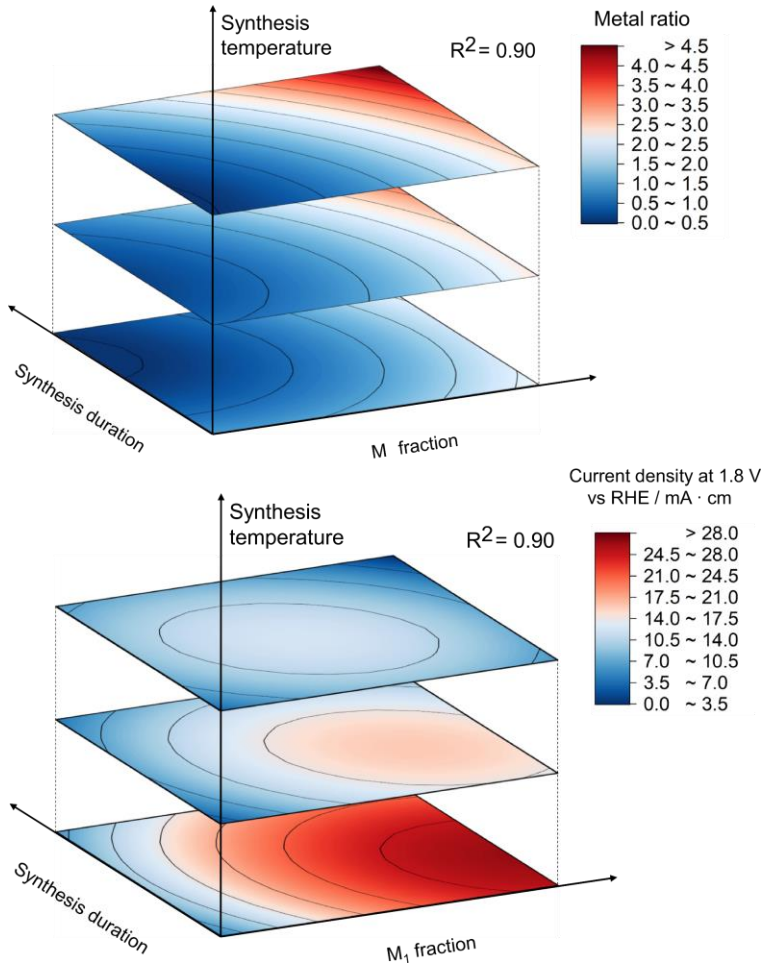
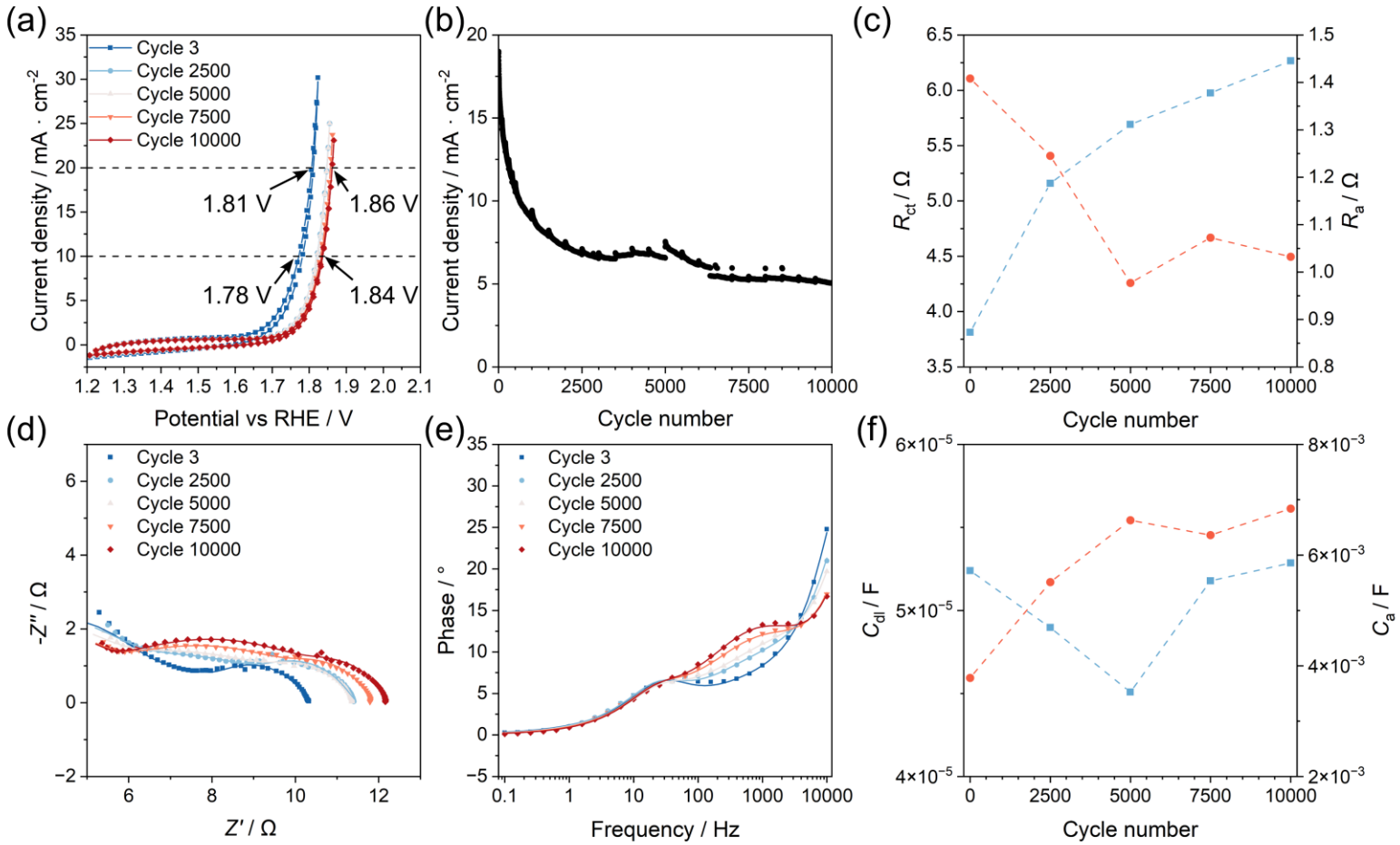
M. Rosenthal et al. Exploring the catalytic activity and deactivation pathway of fluorine-doped copper manganese oxides for the oxygen evolution Reaction, submitted.

MMO on Ti mesh: optimization and electrochemistry

optimization: design of experiments



initial electrochemical testing



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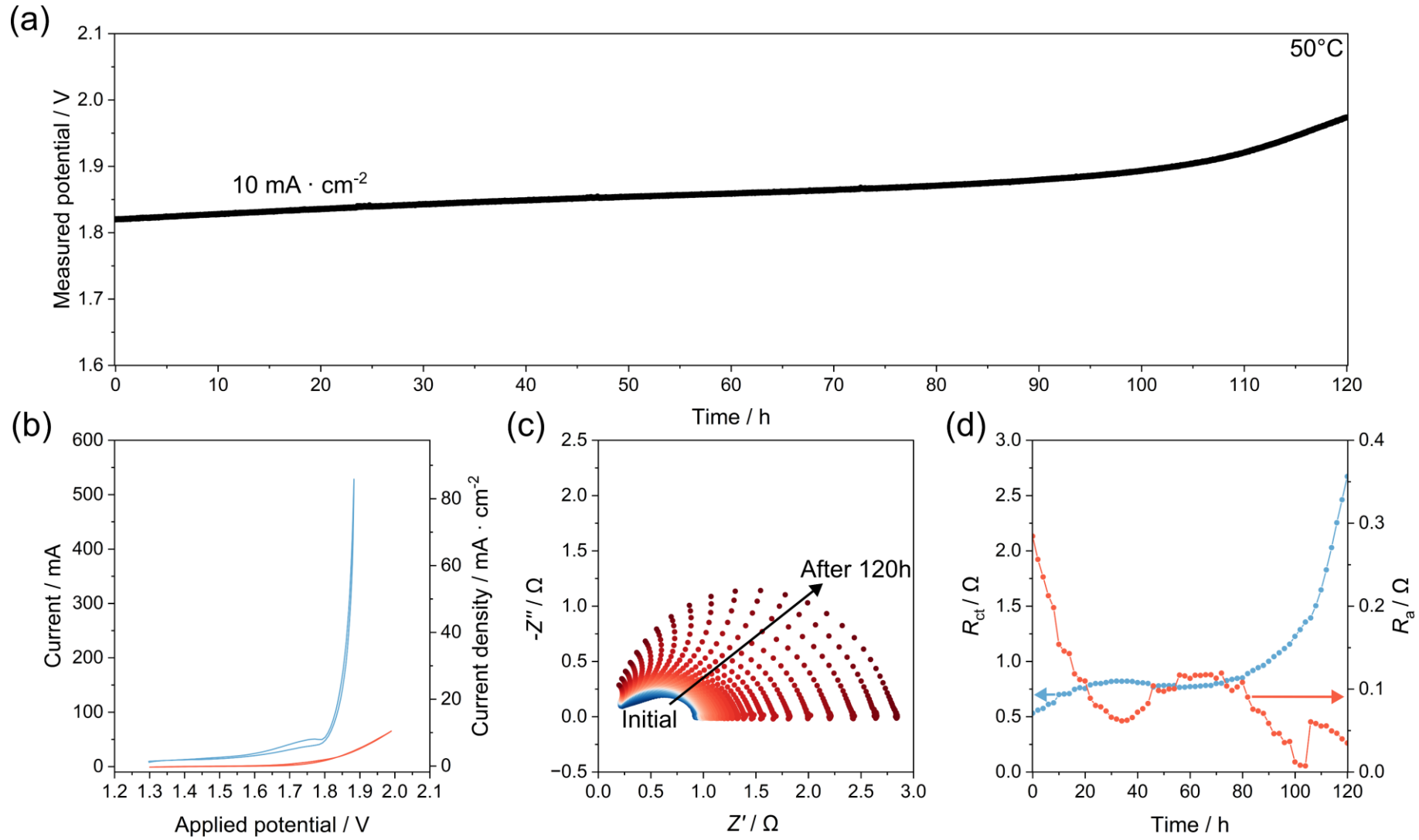
M. Rosenthal, T. Kallio, Invention disclosure filed to Aalto University with nr. IPID: 3582 29.04.2024.

MMO on Ti mesh: integration to aPEM electrolyser



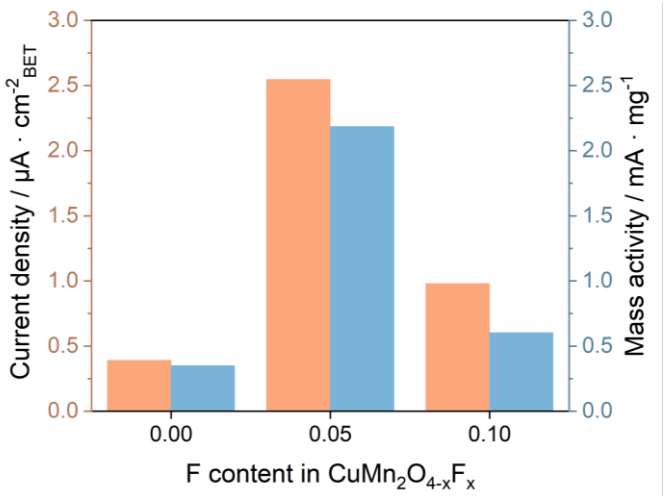
Manuscript on the first generation of PGM free/lean OER electrodes, Aalto

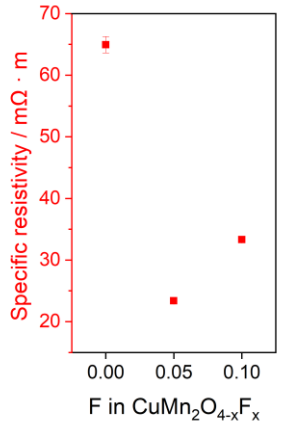
Manuscript on the 1st generation OER electrodes under review:

M. K. Rosenthal, K. M. Macounová, L. Moumaneix, E.-L. Rautama, J. Lahtinen, P. Krtil, T. Kallio, Exploring the catalytic activity and deactivation pathway of fluoride-doped copper manganese oxides for the oxygen evolution reaction, submitted.

Manuscript on the 2nd generation OER electrodes under preparation:

M. Rosenthal, L. Moumaneix, T. Priamushko, E. Rautama, J. Lahtinen, H. Jiang, S. Cherevko, T. Kallio, Optimizing an iron and manganese-based electrocatalysts for the oxygen evolution reaction in a proton exchange membrane electrolyzer, in progress.





Fluorine F content in the first generation OER catalyst affects the conductivity and thus the catalytic activity.

Dissemination and international collaboration

- Three conference presentations
- Two manuscripts
- One innovation notification
- Two research visits
    - P. Krtil, J. Heyrovsky Institute of Physical Chemistry, Prague, Czech
    - S. Cherevko, FZ Jülich, Erlangen, Germany

Kiitos
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