

Amperometric State-of-Charge Monitoring for VFB

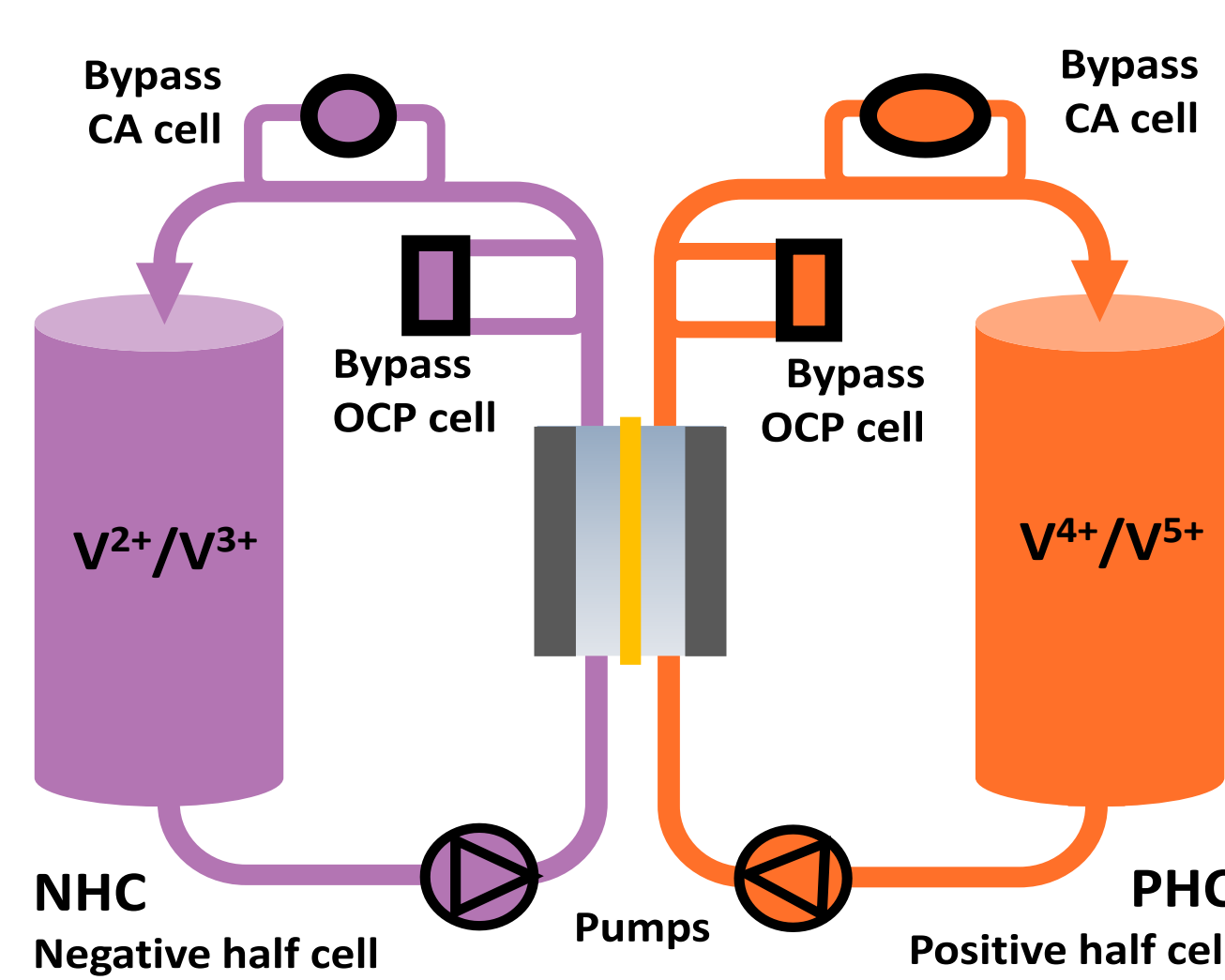
Claudia Weidlich, Meiser Valencia, Felix Lulay, DECHEMA-Forschungsinstitut, Frankfurt, Germany
claudia.weidlich@dechema.de

Scope

- Several analytical methods have already been used in order to predict the State-of-Charge (SoC) for Vanadium-Flow-Batteries (VFB). [1] - [4]
- We show the feasibility of Amperometric monitoring for SoC determination in VFB half cells under operation.
- Results are in good accordance to SoC determined from Open Circuit Potential (OCP) measurements and titration of electrolyte samples.

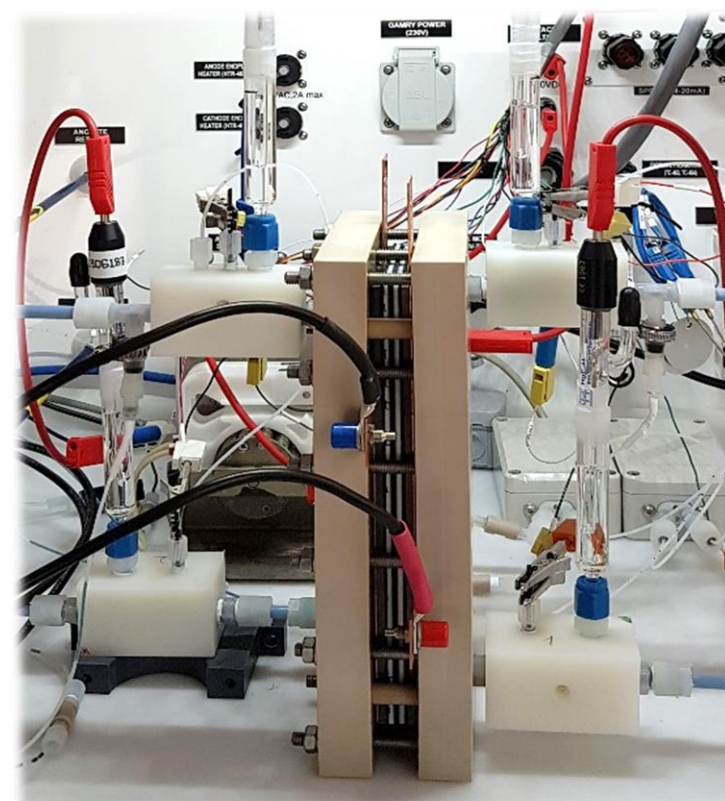
Battery

Electrolyte:
 1.6 M V in
 2 M H_2SO_4 ,
 GfE



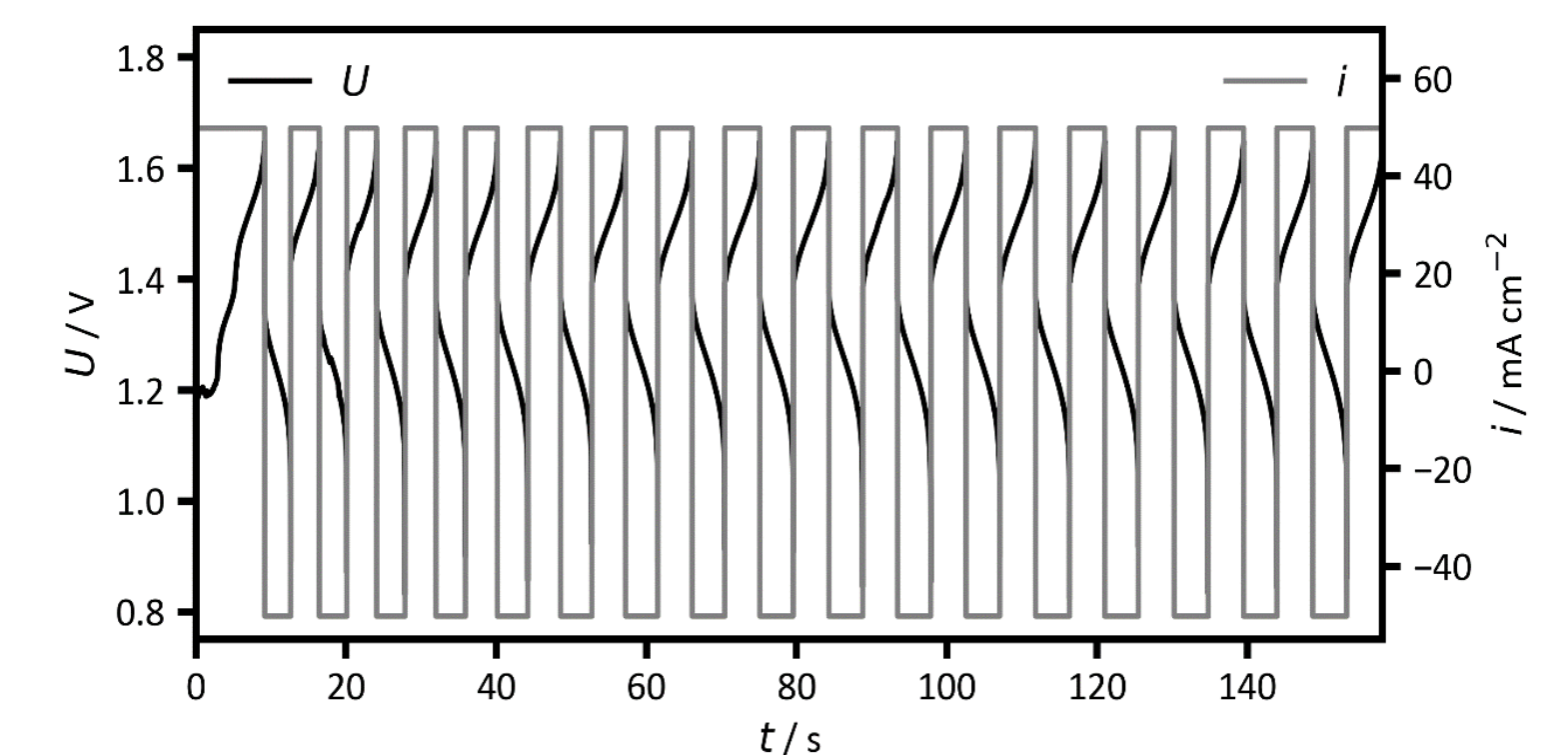
Battery cell

20 cm²
 manufactured,
 fumasep
 FAP450®
 fumatech,
 Sigracell®
 GFD 4.6
 SGL



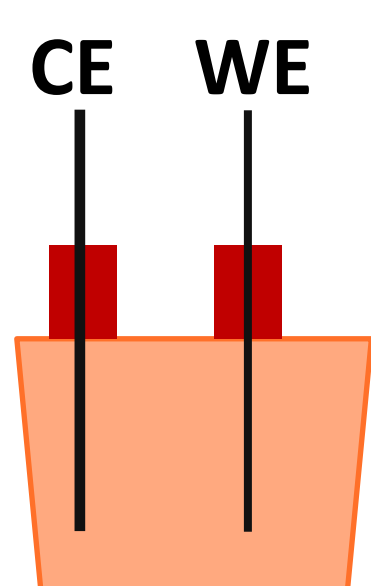
Battery operation

Charge / Discharge
 50mAcm⁻¹
 Electrolyte flow
 50 mL min⁻¹

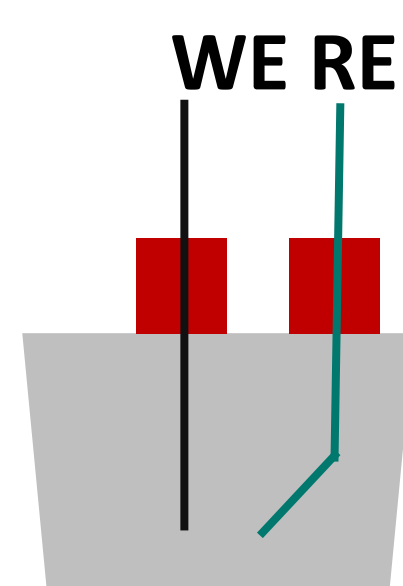


Test setup for Open Circuit Potential and amperometric monitoring

Amperometry (CA)



Open Circuit Potential (OCP)

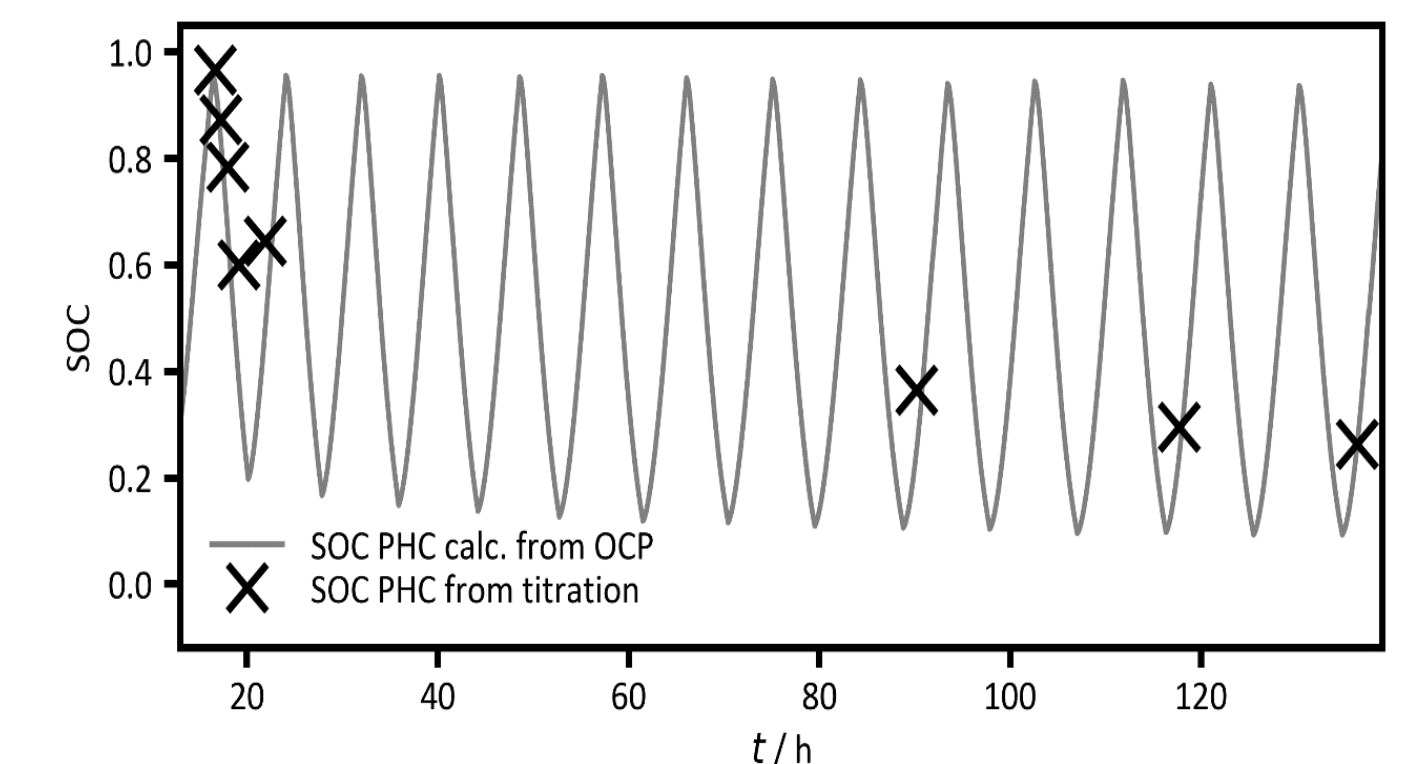


Manufactured flow-cell

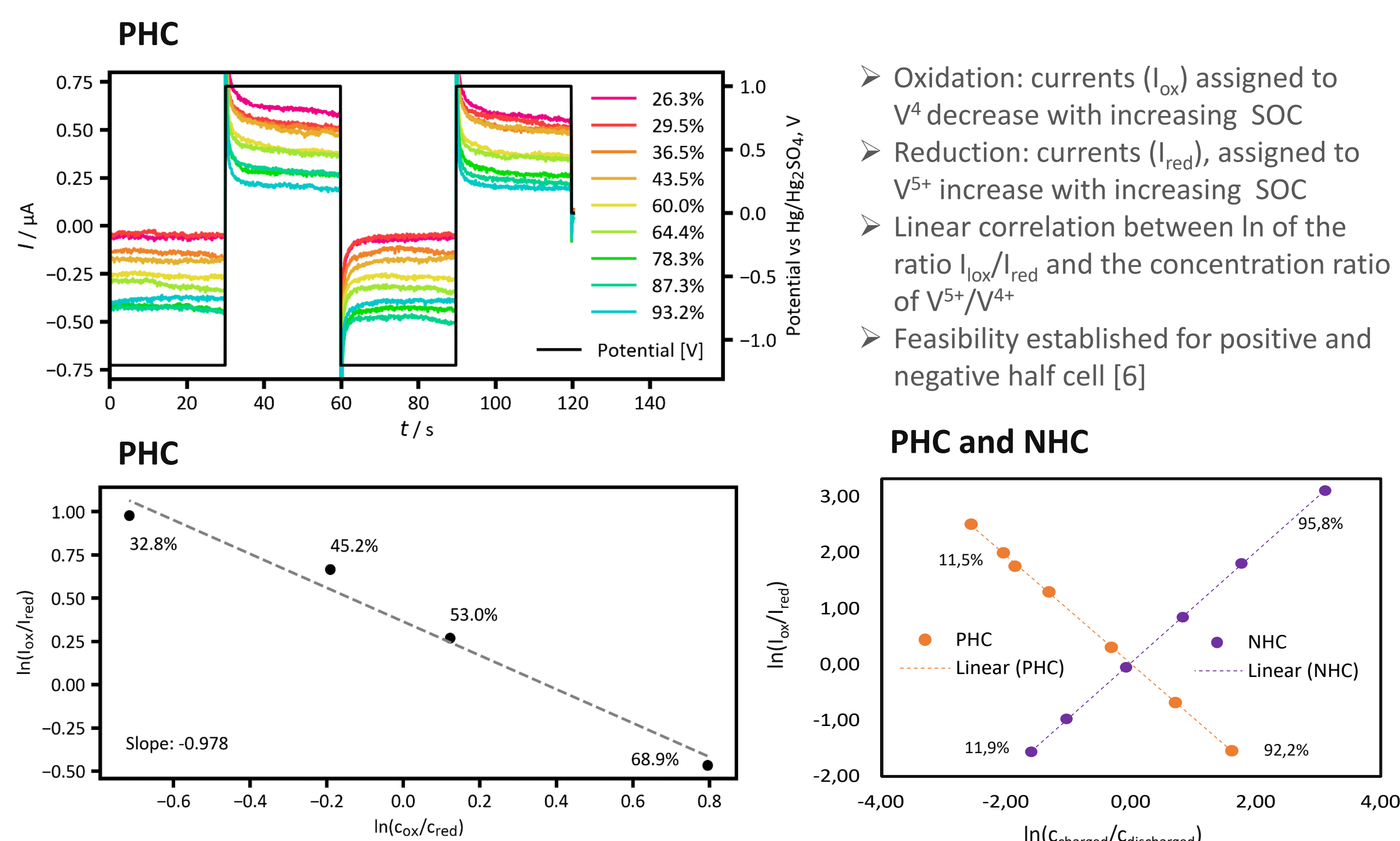


Experiment

- CA** WE: GC rod (2mm Ø)
 CE: GC rod (2mm Ø)
- OCP** WE: GC rod (2mm Ø)
 RE: Hg/Hg₂SO₄
- Amperometric measurements (30 s interval)
- Potentiometric titration (5ml samples)

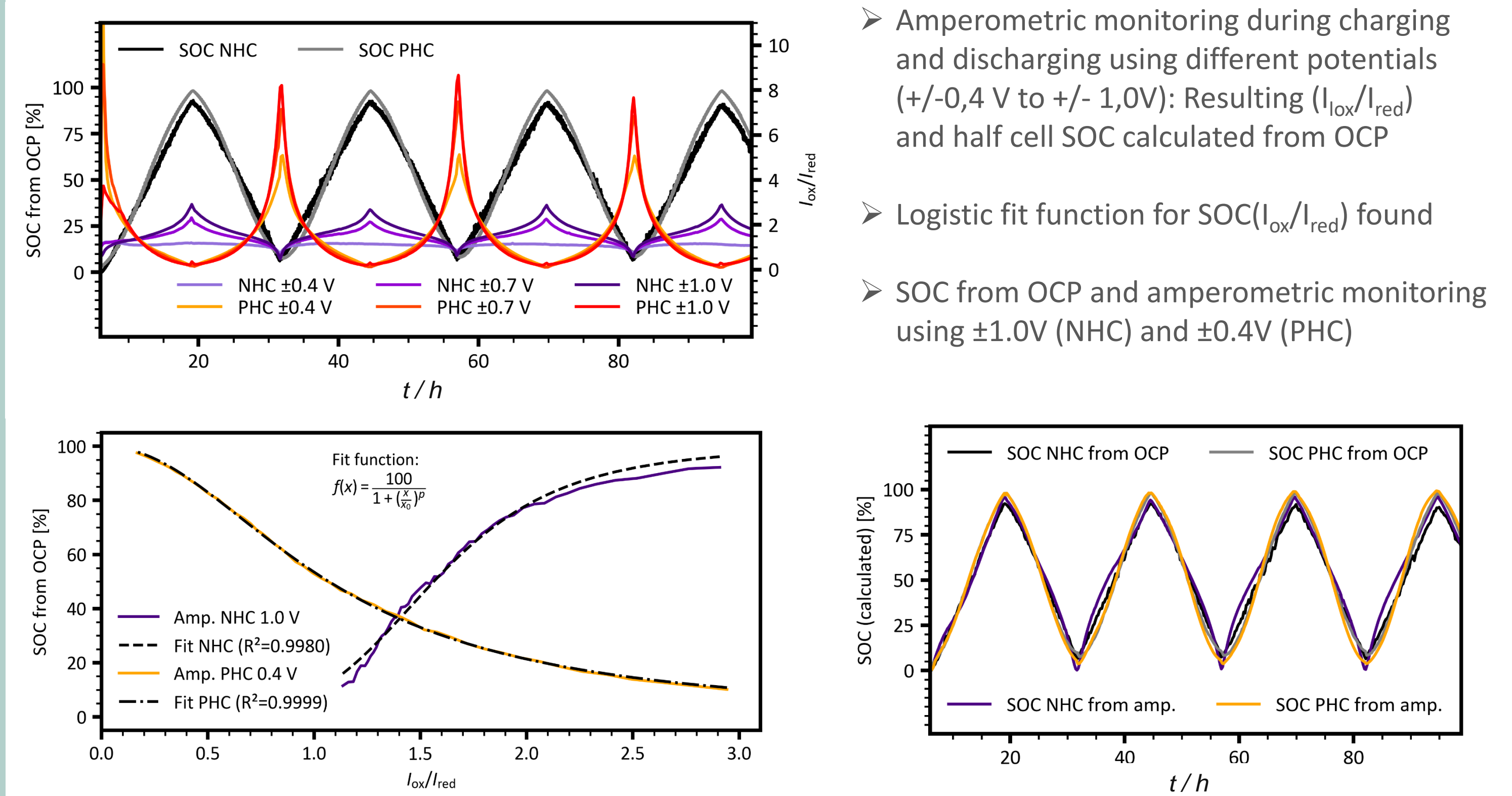


Amperometric half cell measurement



Amperometric monitoring *in situ* at PHC and NHC

Battery under operation



Literature

- [1] T. Haisch, Electrochimica Acta, Bd. 336, 35573, 2020. [2] S. Ressel, Journal of Power Sources, 776-783, 2018. [3] T. Struckmann, Electrochimica Acta, p. 137174, 2020. [4] T. Haisch, Membranes, Bd. 11, 232, 2021. [5] C. Stolze, Chemistry of Materials, 5363-5369, 2019. [6] C. Weidlich, F. Lulay, M. Wieland, Journal of Electrochemical Science and Engineering, 13, 5, 2023.