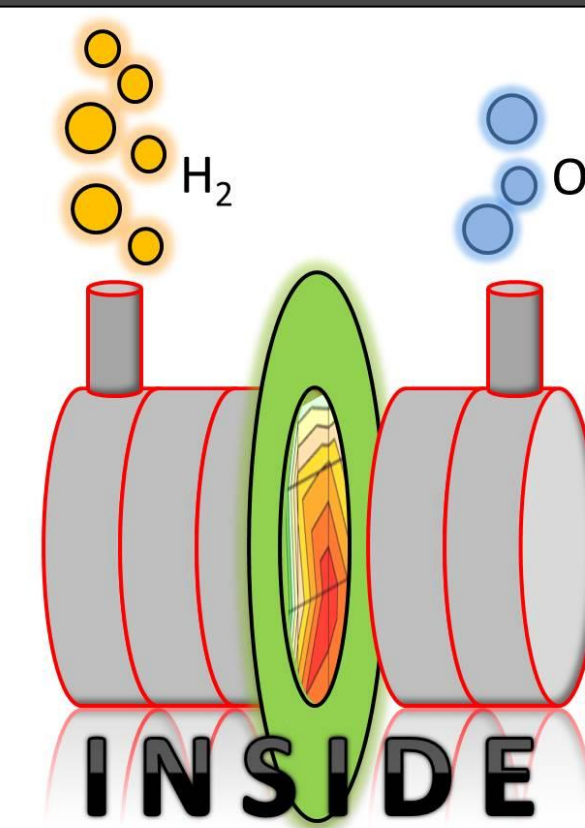




Objectives

An electrochemical in-situ diagnostics tool for monitoring of locally resolved current densities, originally developed for application in PEM fuel cells, is adapted to water electrolysis:

- PEMWE: based on proton exchange membranes
- AWE: alkaline water electrolysis
- AEMWE: based on anion exchange membranes

The developed tools allow to correlate performance issues and ageing processes with local anomalies. Corresponding mechanisms are investigated with ex-situ analytics.

Partners

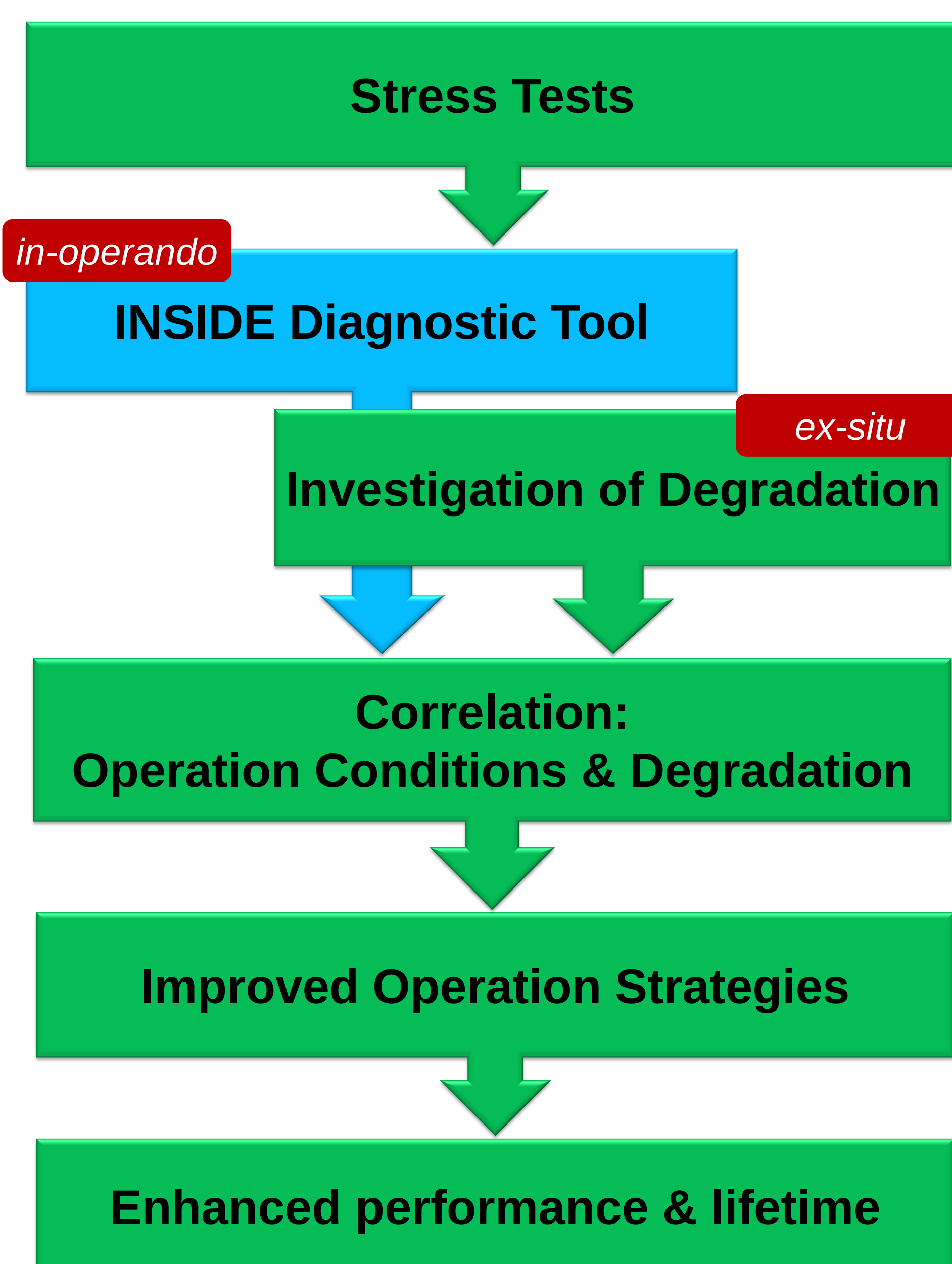
- Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Stuttgart, Germany (Coordinator)
- NEL Hydrogen AS, Notodden, Norway
- Heliocentris Italy S.r.l., Crespina, Italy
- Centre National de la Recherche Scientifique, France
- Université de Strasbourg, Strasbourg, France
- Hochschule Esslingen, Esslingen, Germany



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Strategy



Perspectives

The patented segmented printed circuit board (PCB) for the monitoring of current density distributions in PEM based fuel cells is used and steadily improved at DLR.

- Monitoring of performance and local anomalies during operation
- Revealing systematical deficiencies not detectable offline
- Correlating degradation mechanisms and system parameters
- Identifying and preventing critical operation
- Systematically improving the efficiency of water electrolysis
- Recommendations for use of present and for design of future water electrolyzers

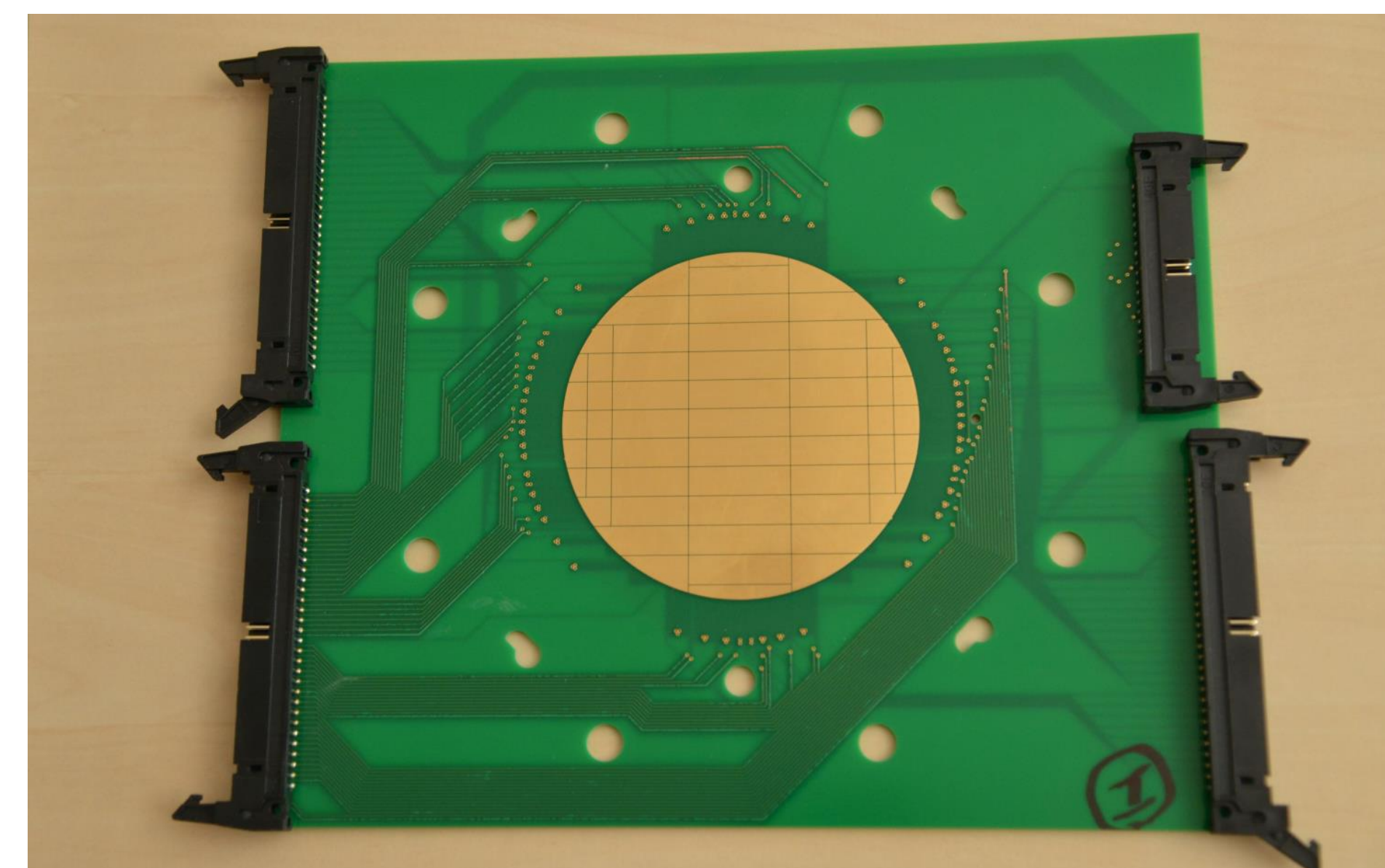
Challenges

Adaptation of segmented PCB:

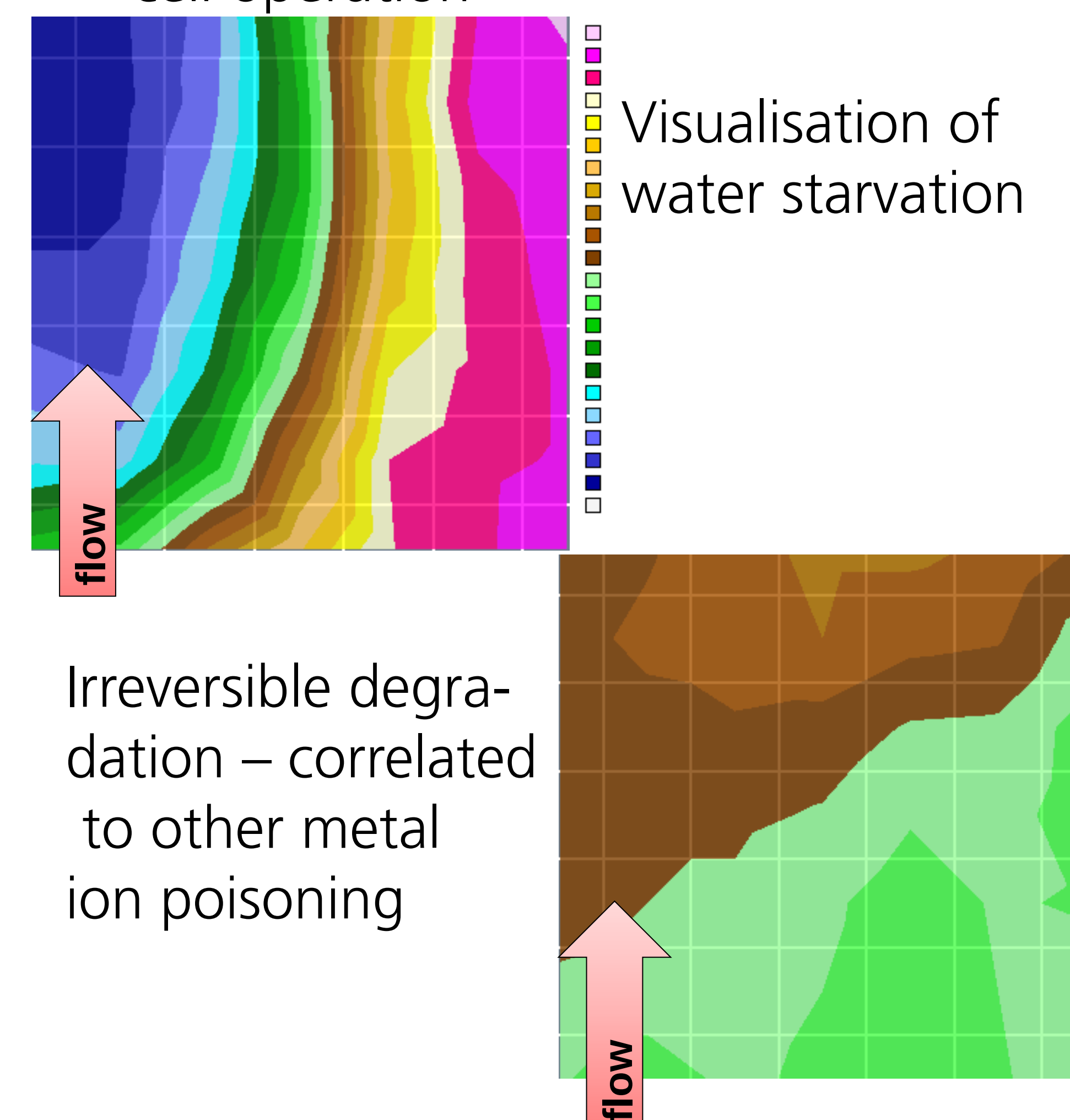
- pH and non H⁺ ions
- Pressure
- Bubble formation
- Sealing

Achievements

- AEMWE: Prototype delivered



- PEMWE: Technology concept in test cell operation



- Operando Electrochemical ambient pressure XPS cell for degradations studies (Saveleva et al, J Phys Chem C 2016, 120, 15930)

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