Towards understanding scaling AWE from lab to stack

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Keywords: Alkaline water electrolysis, scaling effects, stack, flow cell, mechanical contact pressure

Green hydrogen is essential for decarbonizing the economy. The urgency of the transition requires swift transfer from current electrolysis research to industrial application. However, it is challenging to bridge the gap between the research using three-electrode setups and flow cells and the industry employing square-meter-sized stacks.
We have developed a set of tools to diminish this gap and improve the understanding of scaling electrolysis from the laboratory to industrial level (Figure 1). Using these tools, we determine the impact of parameters and their spatial distribution, which may change during scaling up alkaline water electrolysis. These parameters include temperature, contact pressure, gas content, and shunt currents. Key insights are derived for favorable stack design as well as for application-oriented single-cell testing.
Based on these findings, we designed and characterized a 400 cm^2 alkaline electrolysis short stack. Despite the significant scaling step, the electrochemical performance translates well from the single cell to the stack.

Overall, we will show the most important parameters and an innovative stack design for successfully scaling up from single cells to stacks.

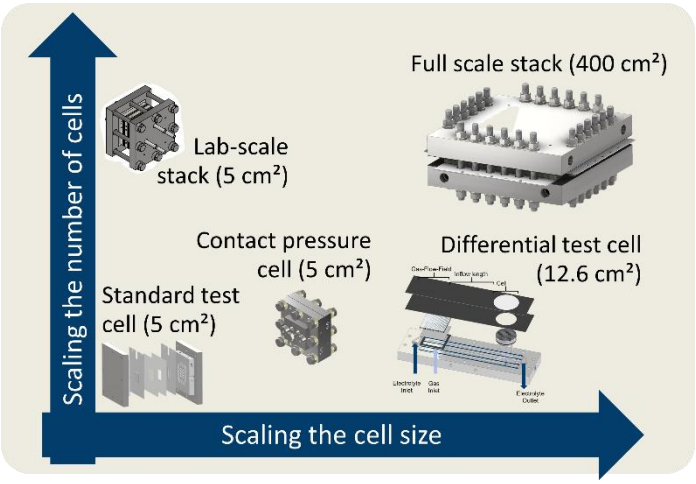

Figure 1: Special cell designs to investigate scaling effects.

Acknowledgements
The presented research was funded by the German Federal Ministry of Economic Affairs and Climate Action and the project "NextH2 - Next generation of powerful and efficient alkaline electrolyzers for regenerative H2 generation" 03EI3011A-C.