# Evaluation of the activity of Ni-based materials for water splitting in alkaline media by SECCM

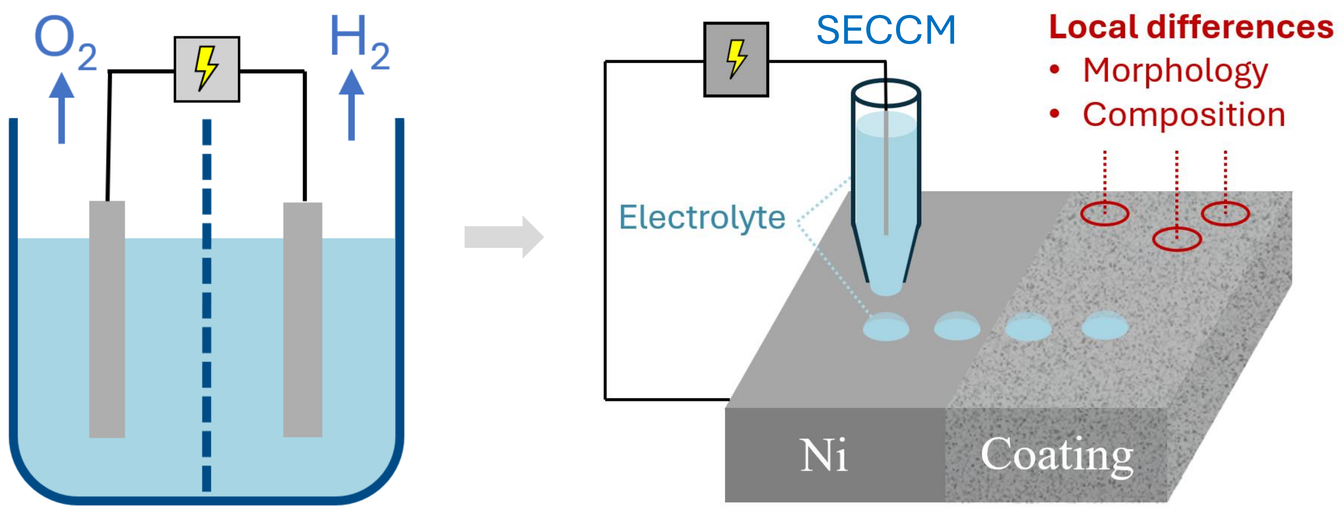
Voronkin Anton[1],
Vanhumbeeck Jean-François[2], Job Nathalie[3], Ustarroz Jon[1,4]
*[1]ChemSIN, [2]CRM group, [3]ULiège, [4]VUB*

Avec le soutien de la Wallonie

## Alkaline Water Splitting

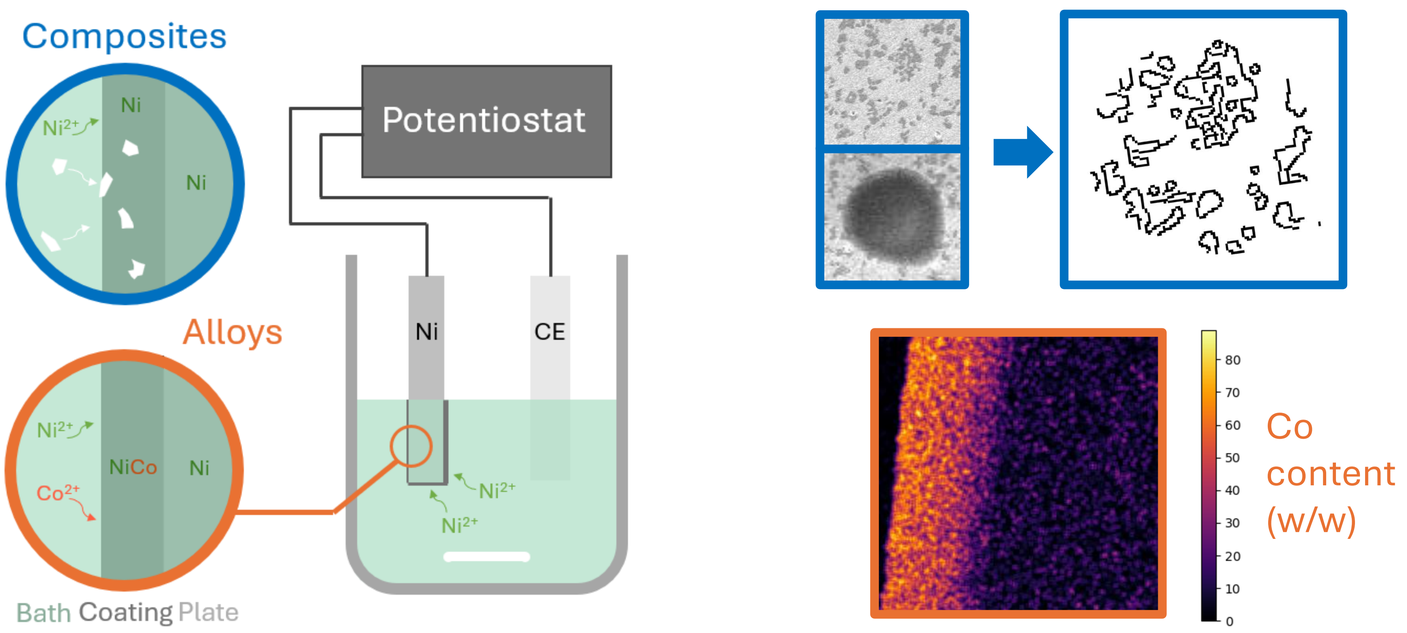
- **Green energy storage** with $H_2$
- Low cost materials are **stable** enough for viable use
- **Improvement** of their catalytic activity is still needed for industrial use
- Traditional electrochemical cells **lack efficiency** to assess the performance for a variety of electrode parameters

## A **high-throughput** analysis of electrochemical activity




## **Heterogeneous materials** for SECCM

### Electrodeposited catalytic coatings

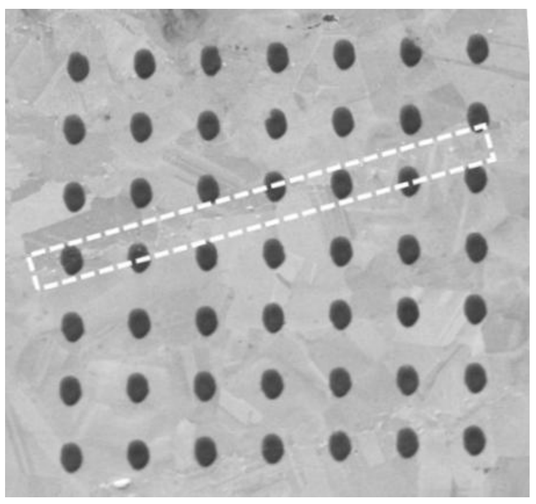






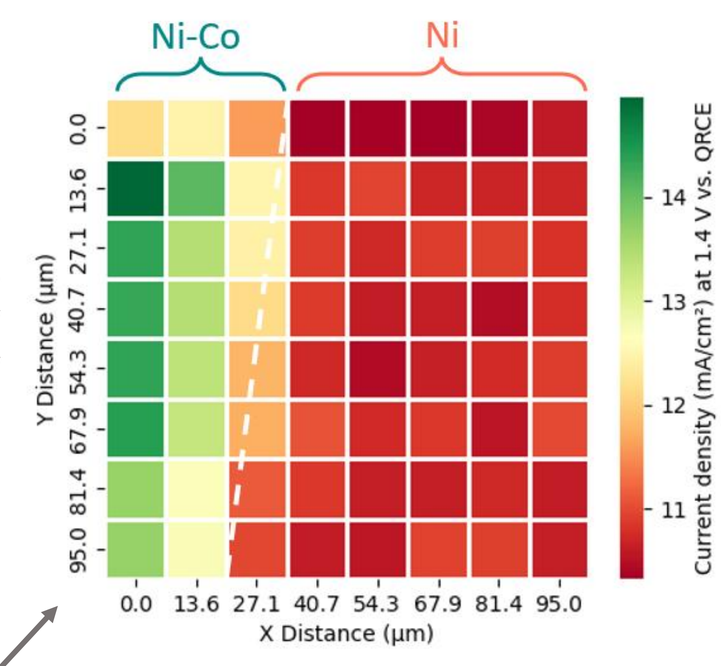
### Large grain-sized[1]

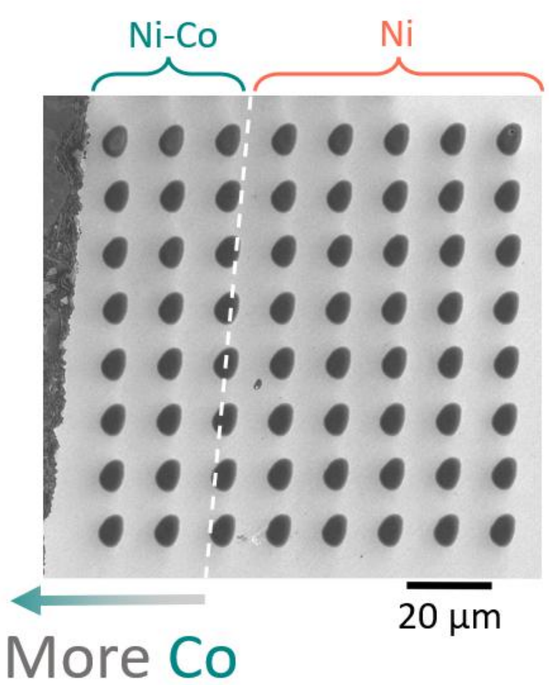
Collaboration with NIC



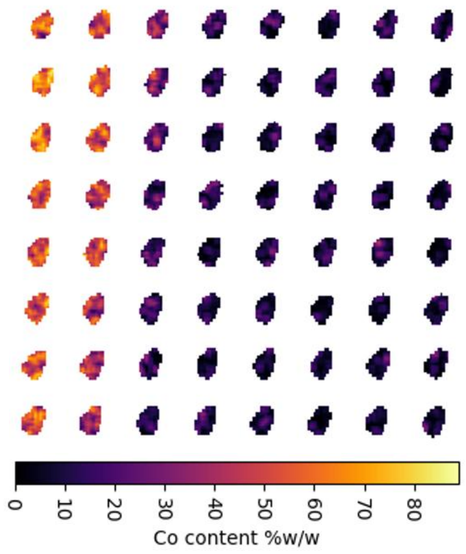
## **Identical location** SECCM (alkaline)[2] - EDX

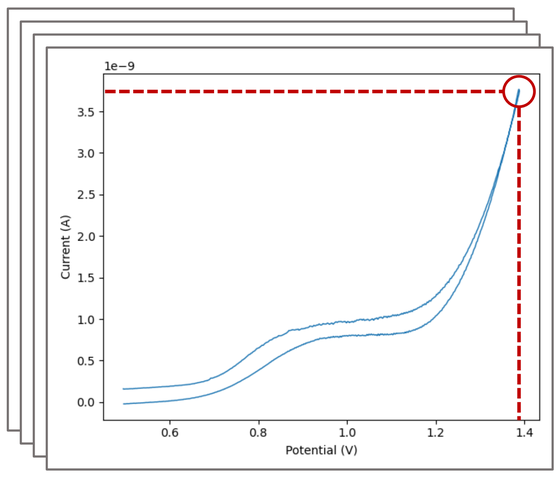
OER Activity by SECCM



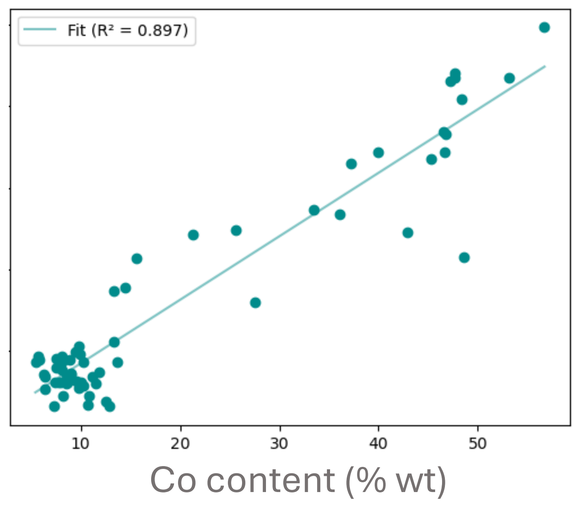




Energy Dispersive X-ray Spectroscopy (EDX)




**Conclusions[3]:**
Ni-Co Activity > Ni Activity
Activity ∝ Co content




OER Activity ($mA/cm^2$)

[1] Donik, Č., Suhadolnik, L., Tomc, B., Voronkin, A., Ustarroz, J., Bele, M., Godec, M., & Hodnik, N. (2025). Grain-resolved mapping of oxygen evolution activation on a Ni-superalloy. *Chemical Communications*. https://doi.org/10.1039/D5CC02703A
[2] Arruda De Oliveira, G., Kim, M., Santos, C. S., Limani, N., Chung, T. D., Tetteh, E. B., & Schuhmann, W. (2024). Controlling surface wetting in high-alkaline electrolytes for single facet Pt oxygen evolution electrocatalytic activity mapping by scanning electrochemical cell microscopy. *Chemical Science*, *15*(39), 16331-16337. https://doi.org/10.1039/D4SC04407J
[3] Voronkin, A., Costea, S., Zhu, X., Robert, D., Vanhumbeeck, J-F., Job, N., Ustarroz, J. (2025) *Paper in preparation*.