



eChemicles

**ELECTROLYSIS FOR
A BETTER TOMORROW!**

Topic - „Low-temperature CO₂ electrolysis in a real industrial setting”.

Abstract:

Building a sustainable energy future requires innovative strategies for carbon dioxide (CO₂) utilization. One award-winning approach is low-temperature CO₂ electrolysis, which enables the conversion of CO₂ into valuable chemicals and fuels for several industries. In this presentation, Tamás will discuss the challenges and opportunities in adapting CO₂ electrolysis for industrial application.

Electrochemical CO₂ reduction not only mitigates emissions but also generates valuable products. However, current technologies struggle with energy efficiency and product selectivity. Low-temperature CO₂ electrolyzers, operating under moderate conditions, can be designed for dynamic operation and integration with renewable energy. Zero-gap cell designs enable high selectivity and industrially relevant current densities at low cell voltages, efficiently converting CO₂ into chemicals such as Carbon monoxide (CO) for direct use or syngas applications.

To advance eChemicles' goal of commercializing low-temperature CO₂ electrolysis by 2025, a containerized prototype system was developed to achieve Technology Readiness Level (TRL) 6. The system was designed to produce 100 tonnes of carbon monoxide annually in a carbon negative way.

By early 2026 a second prototype system was manufactured. Upgrades build on our insights gained from the daily operation and testing of eChemicles' first prototype. This next-generation unit marks a major step toward industrialization. It is scheduled for testing in a real industrial environment reaching TRL7 bringing us closer to large-scale deployment, and a more sustainable future.

Beforehand captured CO₂ from different industrial sources was tested for electrolysis applications, providing valuable insights into impurity tolerance.

Scaling low-temperature CO₂ electrolysis requires advancement in catalysts, cell design, and system integration, supported by collaboration across academia, industry, and policy to achieve performance, stability, and economic viability for industrial carbon utilization.

