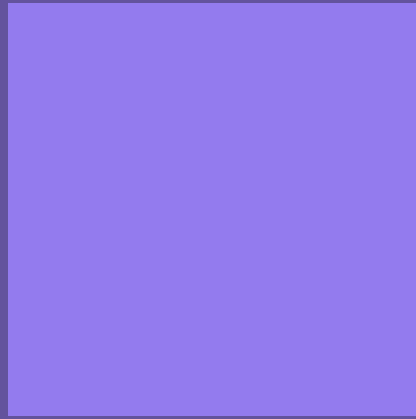


Advanced  
**ELECTRODES**  
for Next Generation  
Flow Batteries

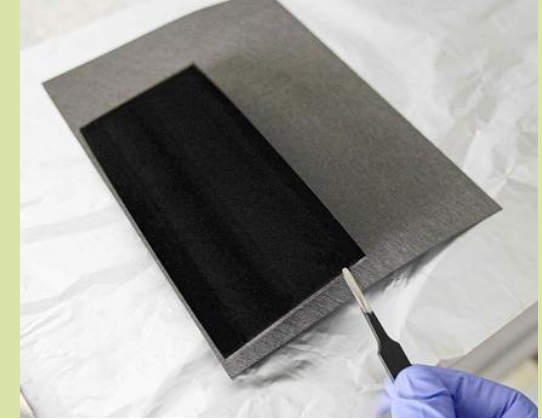
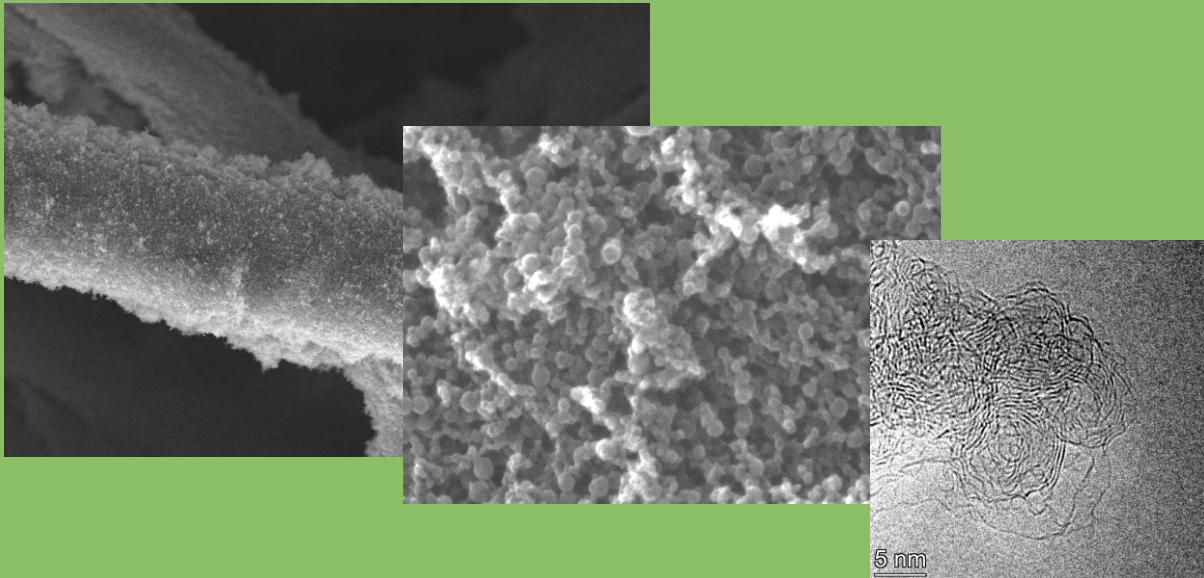


**flow nano**  
unlock your flow potential

# Company Overview

Flow-nano is an innovative startup based in Milan, founded in June 2023 as a venture of X-nano - a spinoff of the Istituto Italiano di Tecnologia (IIT), with CDP Tech4Planet as a new Investor.

**Flow-nano** is a component company, designing and producing high performance **nanostructured electrodes** for electrochemical applications, particularly as a first target market, **Flow Batteries**.



With our proprietary **coating technology**, we functionalize carbon fabrics with carbon nanoparticles — boosting **active surface area** and **electrochemical performance**.

### PROBLEM:

Maximizing the potential of renewable energy requires **Long-Duration Energy Storage** solutions.

Flow batteries are the most suitable electrochemical option, but their **high cost remains a major barrier**.

### FLOW-NANO SOLUTION:

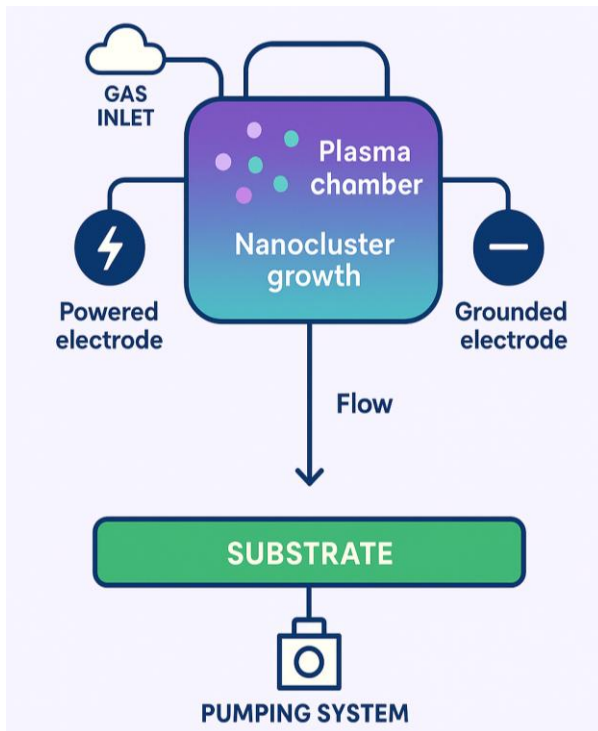
Our cutting-edge **nanstructured electrodes** supercharge Flow Battery performances -

**boosting power density and efficiency**

**Our goal is to enable flow batteries' operations at HIGH current/power density, to reduce the power unit costs.**

# Flow-Nano Technology

Our coating dramatically increases the electrode's electrochemically active surface area



## 2 STEPS PROCESS

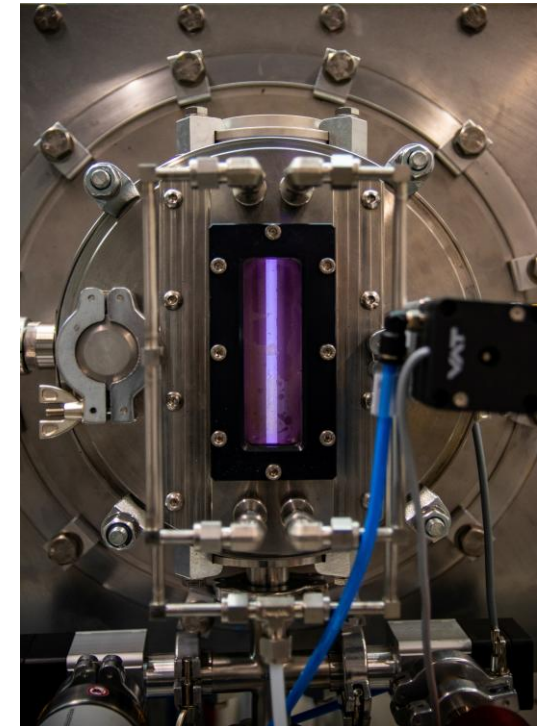
### Particles synthesis and deposition

Carbon nanoparticles are synthesized by means of a cold plasma and deposited on the carbon fibers of the substrate, forming a mesoporous film.

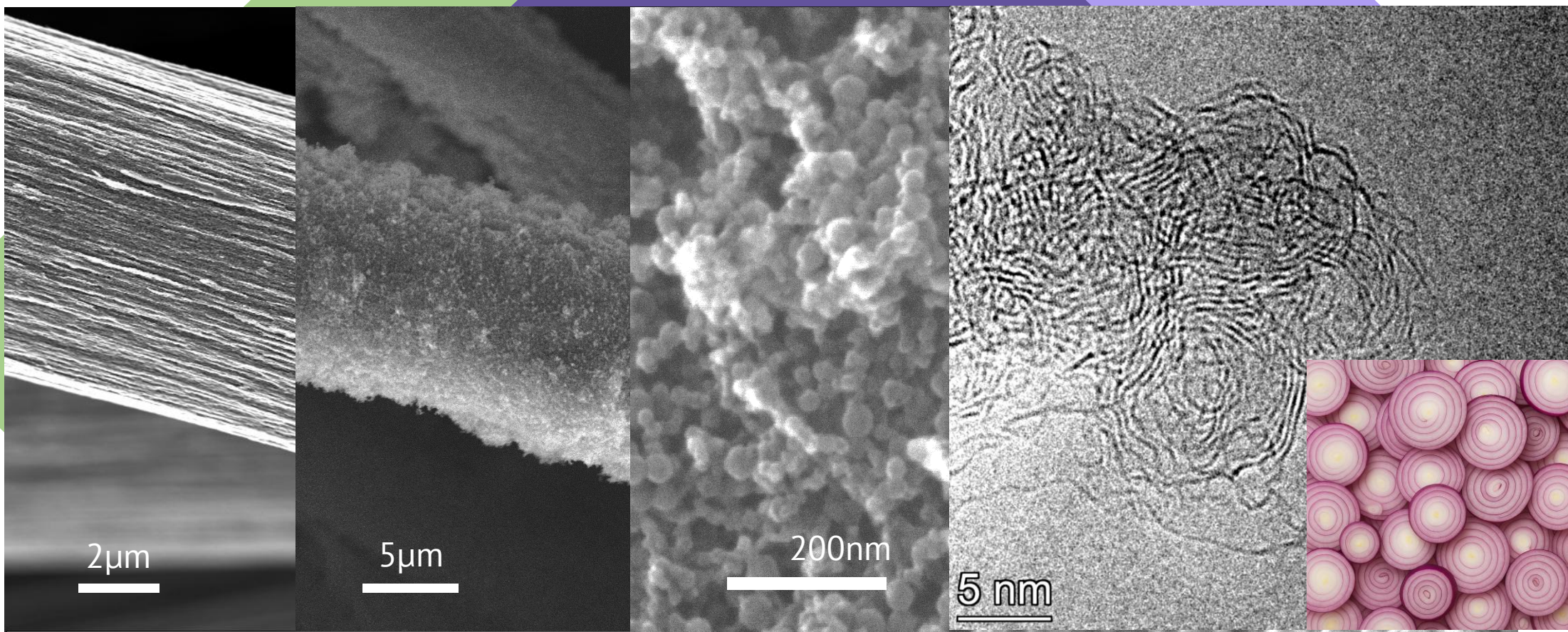
### Thermal post-treatment

The coated electrode undergoes a thermal treatment, converting the particles into CARBON NANO-ONIONS, realizing a SINTERED, EXTREMELY STABLE, CONDUCTIVE COATING.

- DRY PROCESS, SOLVENT FREE
  - LOW EMISSION
- LOW ENVIRONMENTAL IMPACT
  - ZERO WASTE



# Flow-Nano-Onions



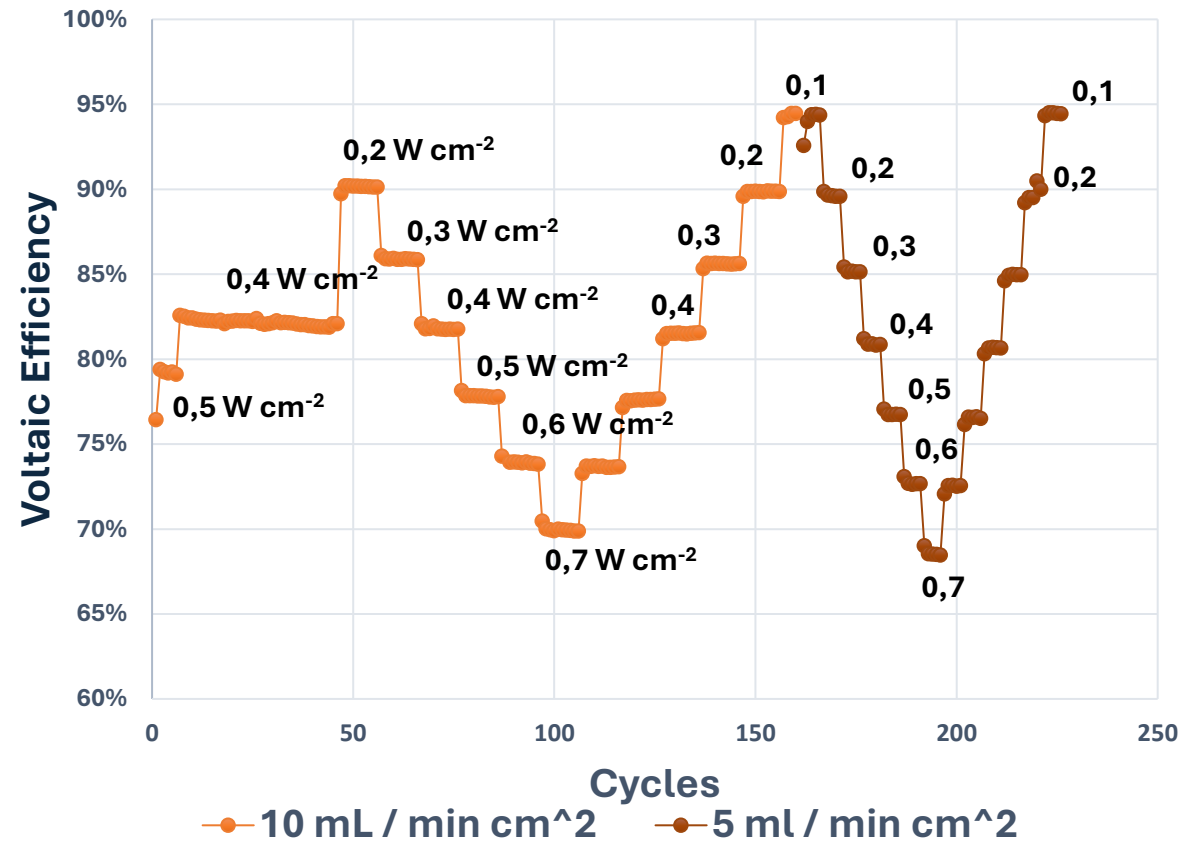
flow

unlock your flow potential **nano**

# Charge-Discharge @ Constant Power

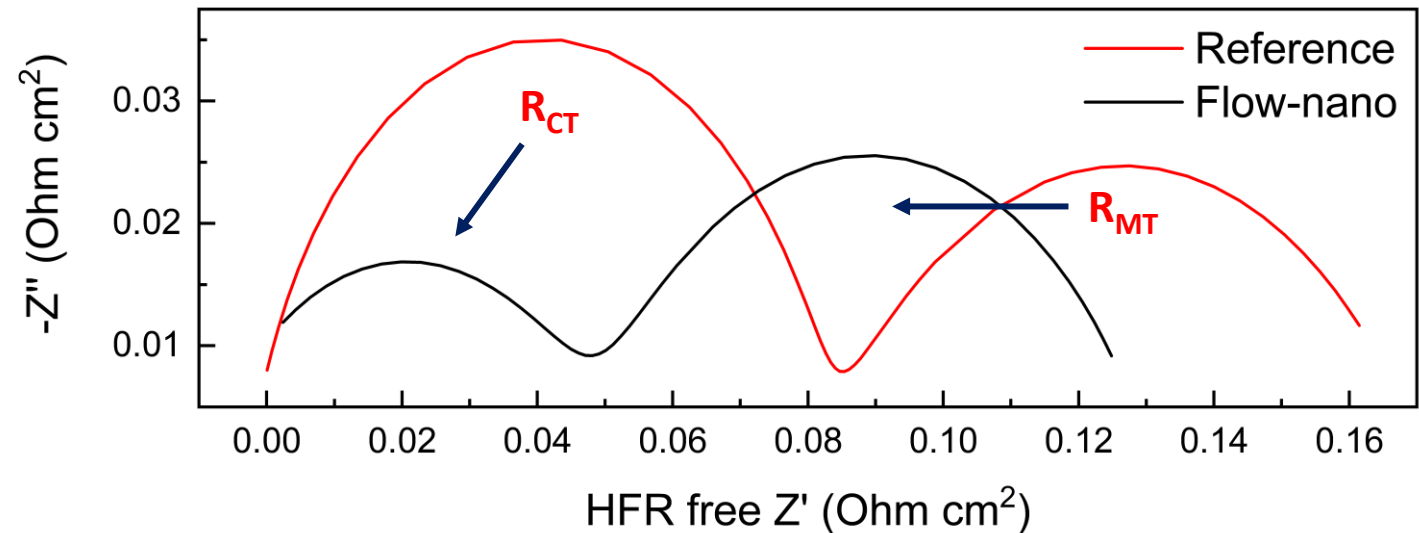
A stack equipped with FN electrodes could normally operate at high power density/high efficiency and could sustain **ultra high power-density** at lower efficiency.

With our electrode, we **boost the current density**, hence the battery power, compared to standard electrodes. Since the power unit cost scales with its surface area ( $\text{€}/\text{m}^2$ ), **this translates into cutting stack cost**



# Electrochemical Impedance

We combine **the low hydraulic and ohmic losses** of thin electrodes with a **superior reaction rate** provided by our nanostructured coating.

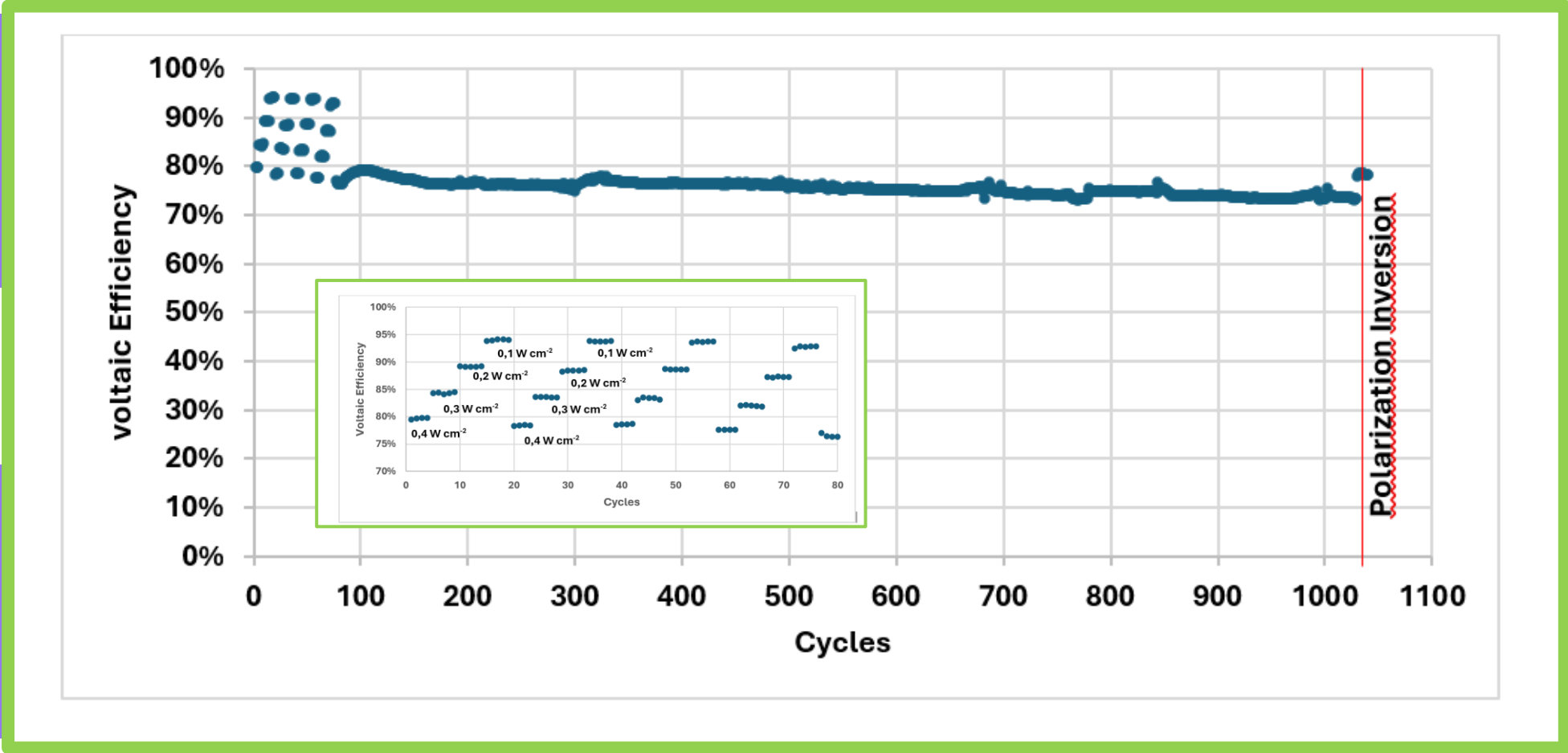


OUR ELECTRODES DOES NOT REQUIRE ANY ACTIVATION TREATMENT

OUR ELECTRODES ARE CHEMISTRY AGNOSTIC: THEY ARE SUITABLE FOR ANY TYPE OF CHEMISTRY

# STABILITY TESTING

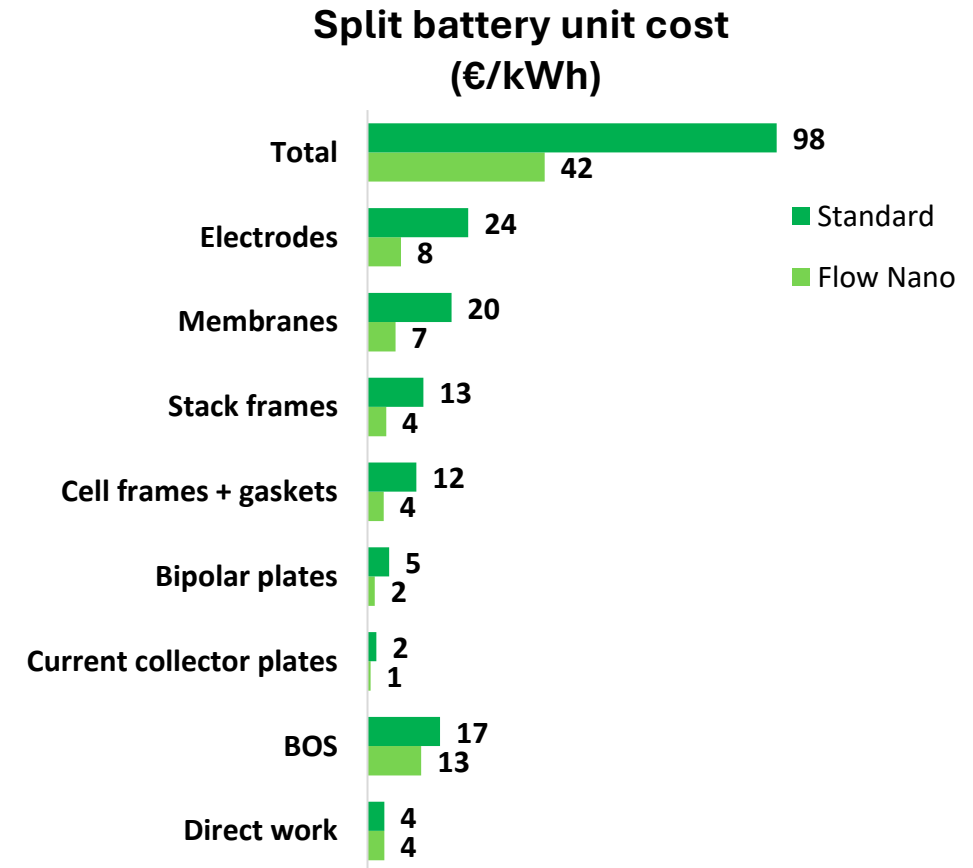
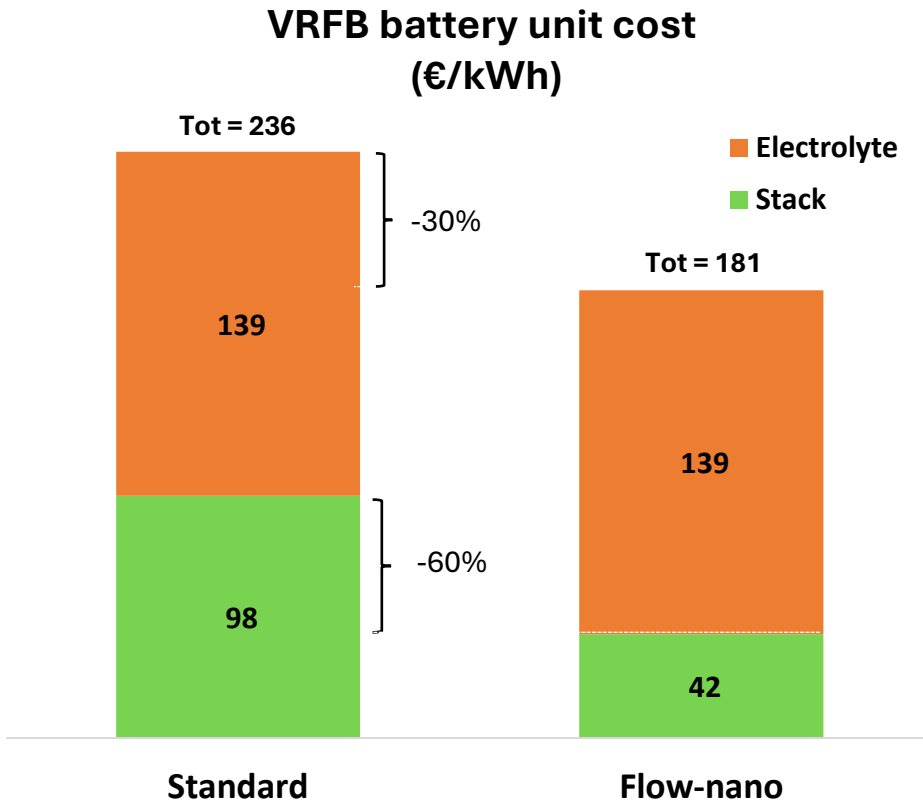
Long term charge-discharge cycling performed at constant power of **400 mW/cm<sup>2</sup>**



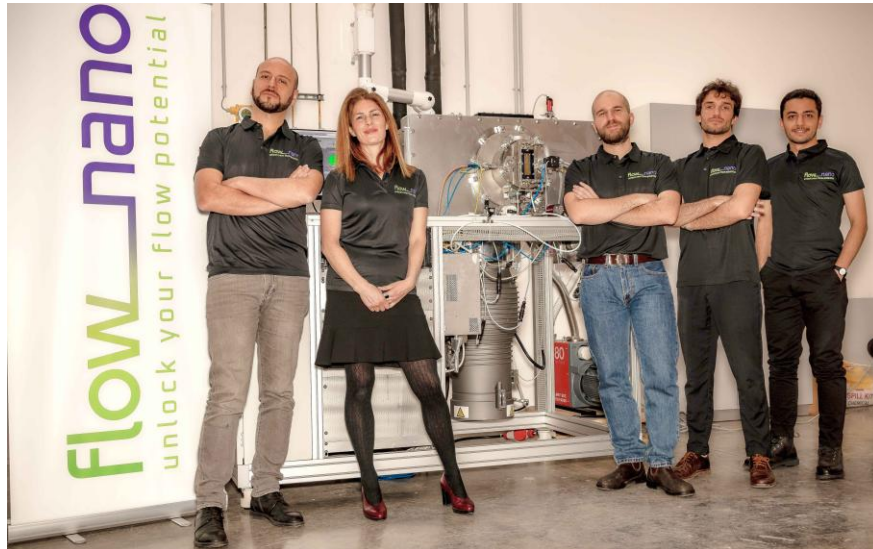
By inverting the cell's polarization, the voltaic efficiency is **restored** to 78%, approaching its initial value.

# Flow-nano electrode projected cost advantage

Flow-nano electrodes rises the battery power determining a great unit cost advantage that translates into a more competitive LCOS for final applications



# 2025: pre-industrial technology upscale



TECH PLANET **flow\_nano**  
IL POLO NAZIONALE DI TRASFERIMENTO TECNOLOGICO PER LA SOSTENIBILITÀ AMBIENTALE  
unlock your flow potential

## Flow-nano Secures €1 Million Funding Round to scale its Carbon Nanoparticle Deposition Technology

The goal is to enable long-lasting, low-cost flow batteries for renewable energy storage

Milan, December 16, 2024 – Flow-nano, an innovative startup developing high-performance nanomaterial-based electrodes for stationary batteries, has completed a €1 million funding round via a SAFE fully underwritten by Tech4Planet, the National Technology Transfer Hub for Environmental Sustainability led by CDP Venture Capital SGR.

Tech4Planet was established to accelerate market access and growth for new enterprises born within research labs dedicated to sustainability, focusing on energy tech, circular economy, sustainable manufacturing, smart mobility, and water management sectors.



**ELECTRODE SIZE = 600 cm<sup>2</sup>**

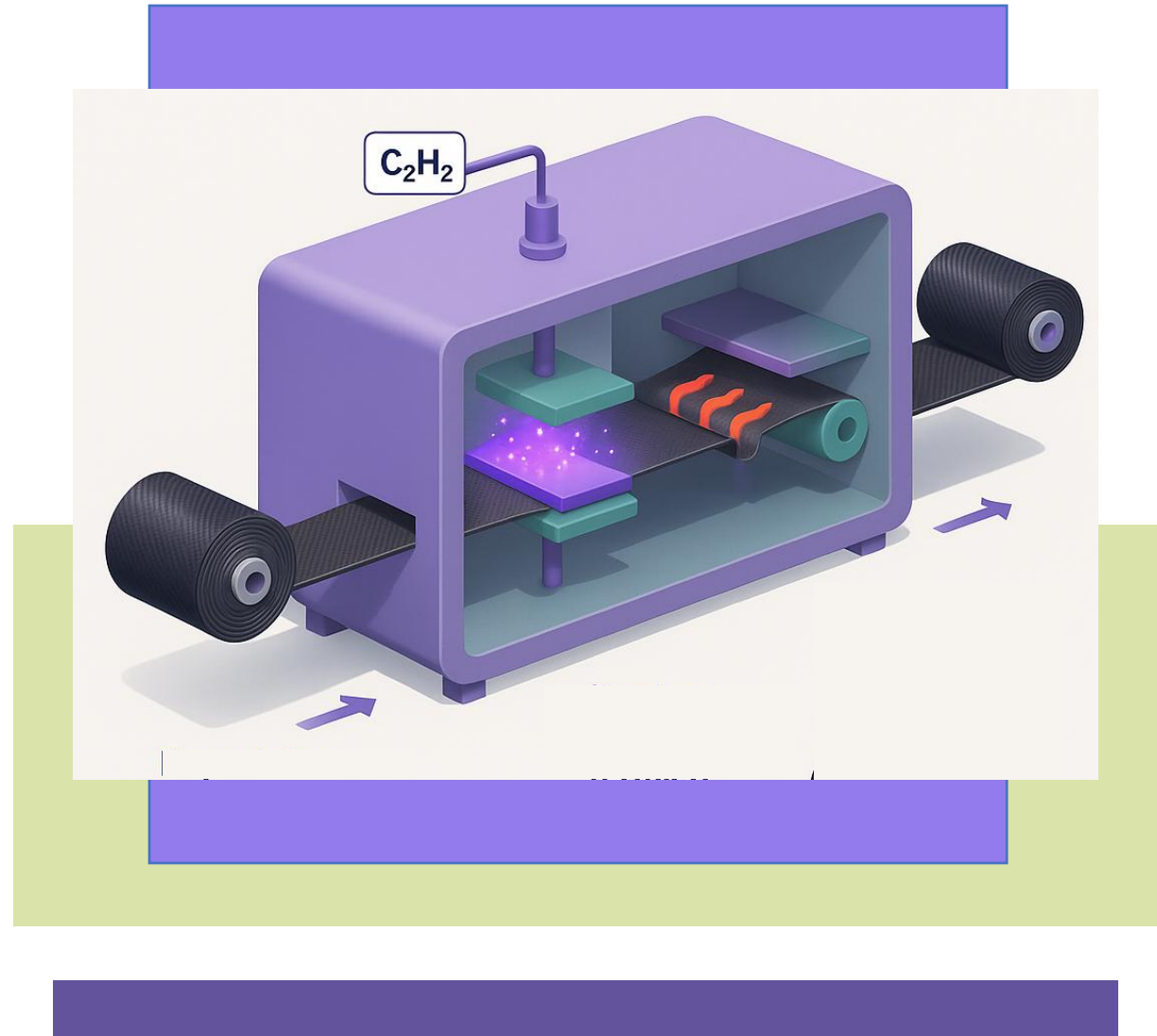


Technology upscale to pre-industrial level on-going



# 2026: full upscale of the technology

Next year, we'll realize our first roll-to-roll industrial coating line



# Flow-Nano Team



**Laura Giorgia Rizzi**  
CEO



**Fabio Di Fonzo**  
CTO



**Carlo Bernardocchi**  
CFO



**Rahul Awashti**  
Process Engineer



**Alessandro Brilloni**  
EC Testing Engineer



**Simone Fiorini Granieri**  
Senior R&D engineer



**Gerardo Pagano**  
R&D engineer



**Pooria Poormehrabi**  
R&D engineer



**Alberto Rauli**  
Admin Specialist



**Hoda Masoud**  
QC Specialist

# OPEN FOR COLLABORATIONS

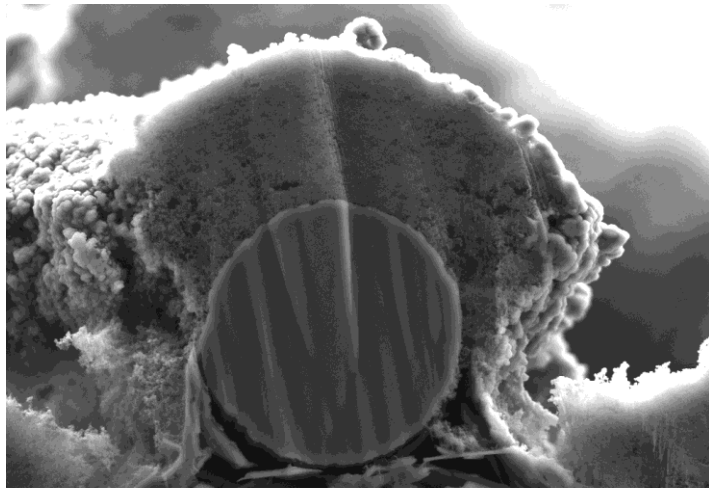
**MATERIALS**



**flow\_nano**



**APPLICATIONS**



2  $\mu$ m EHT = 5.00 kV IProbe = 173 pA Signal A = SE2 Mag = 6.00 K X KIT  
WD = 4.9 mm File Name = CNO80002.tif ESB Grid = 0 V IAM-ESS

We can treat different **SUBSTRATES**

Modify the coating **THICKNESS**

Play with nanoparticles' **CHEMISTRY**

Adapt our technology to various **APPLICATIONS**



**THANK YOU**

[www.flow-nano.com](http://www.flow-nano.com)



flow