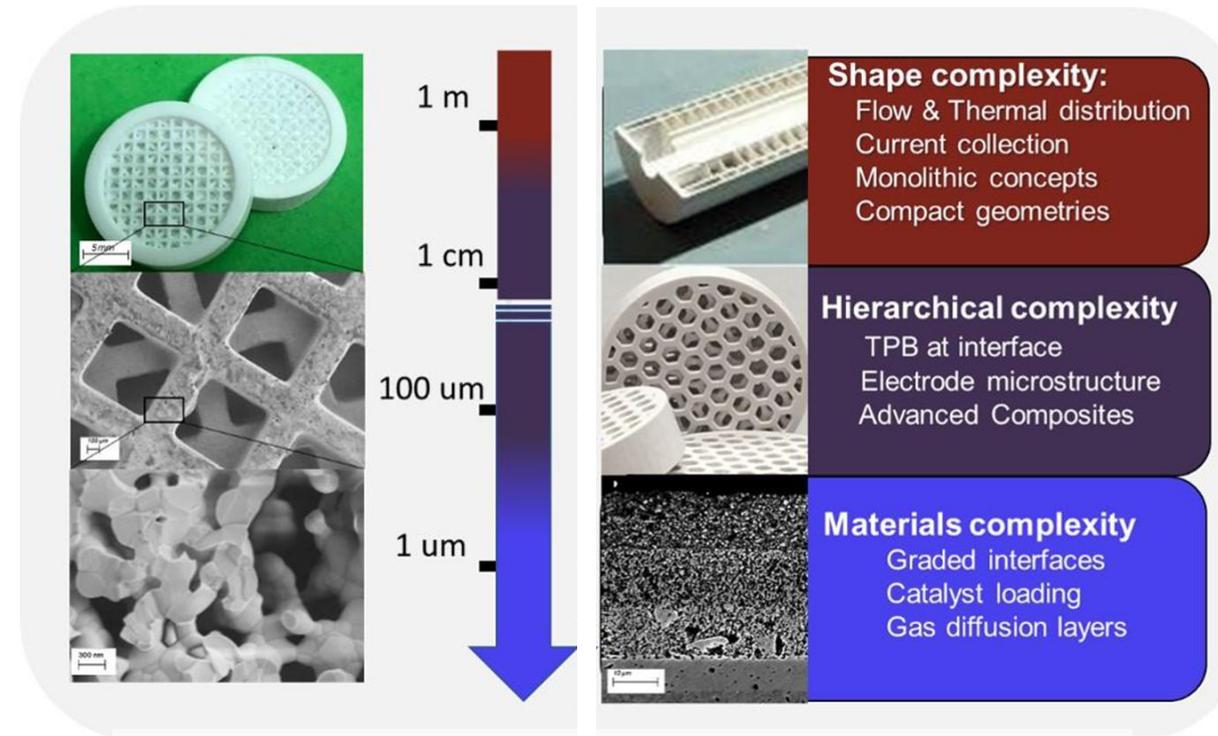
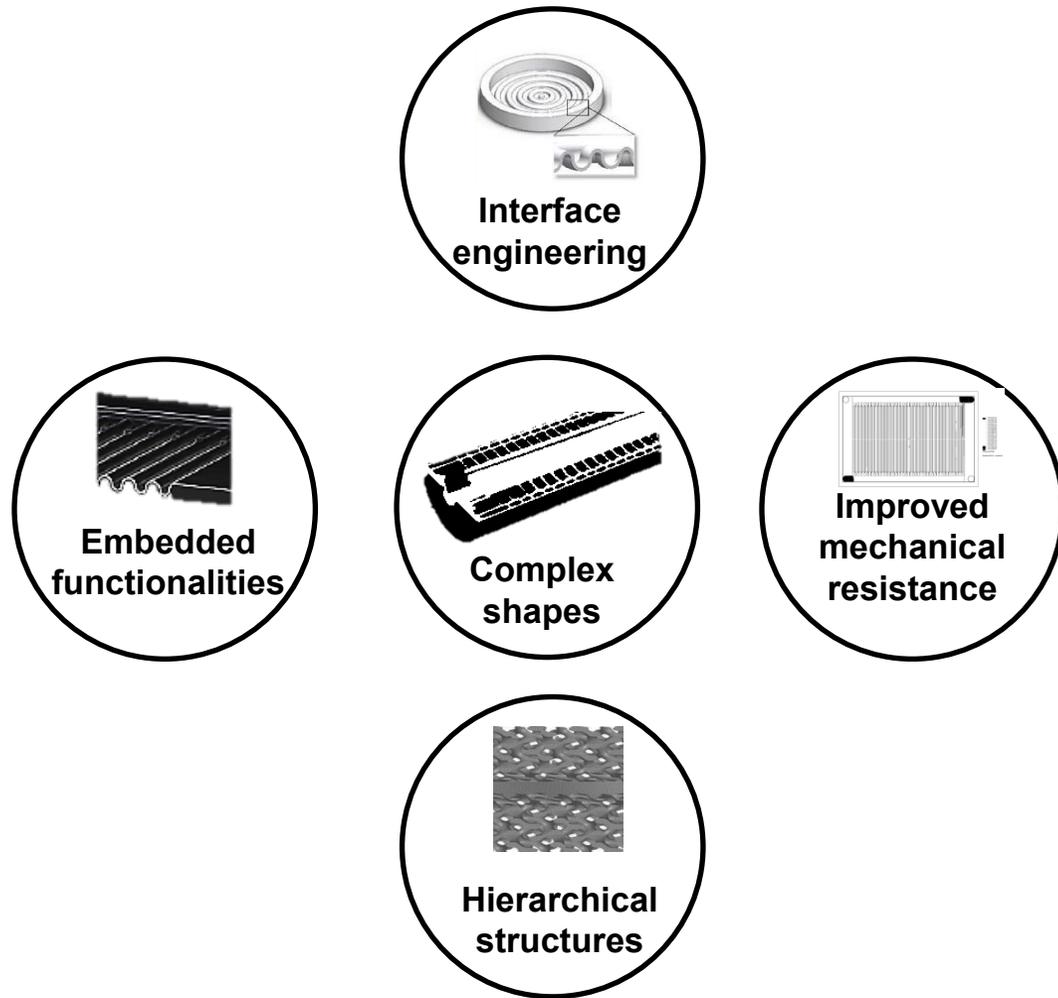


Additive manufacturing of Yttria Stabilized Zirconia for Solid Oxide Cells

A.G. Sabato^{(1)*}, S. Marquez⁽¹⁾, A. Martos⁽¹⁾, N. Kostretsova⁽¹⁾, W. Zambelli⁽¹⁾,
L. Bernadet⁽¹⁾, M. Nuñez Eroles⁽¹⁾, M. Torrell⁽¹⁾, A. Tarancon^(1,2).

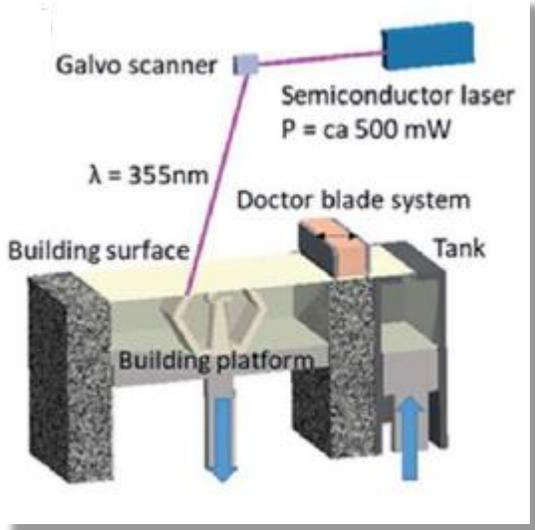
Catalonia Institute for Energy Research (IREC), Department of Advanced Materials for Energy, Sant Adria de Besos, Barcelona, Spain

WHY ADDITIVE MANUFACTURING OF SOC?

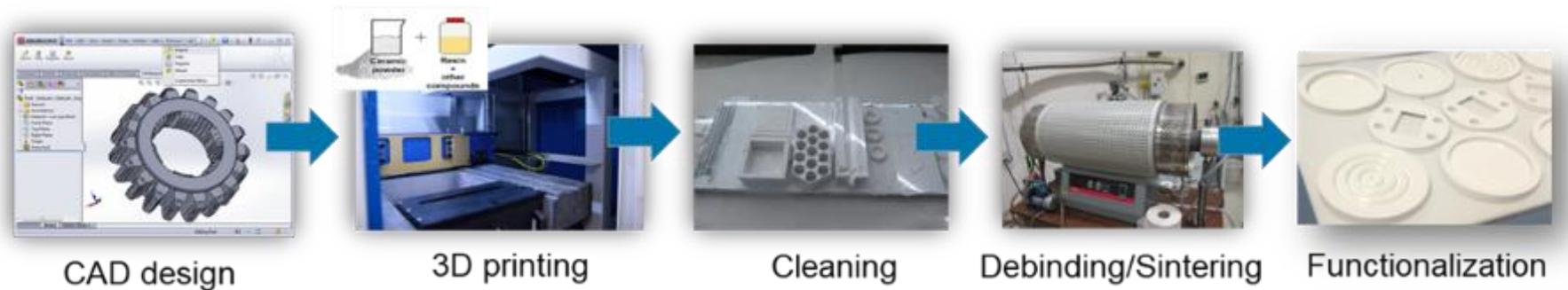


Roadmap on 3D printing for energy, Tarancón* et al. *J. Phys Energy* 4 (2022) 011501

STEREOLITOGRAPHY



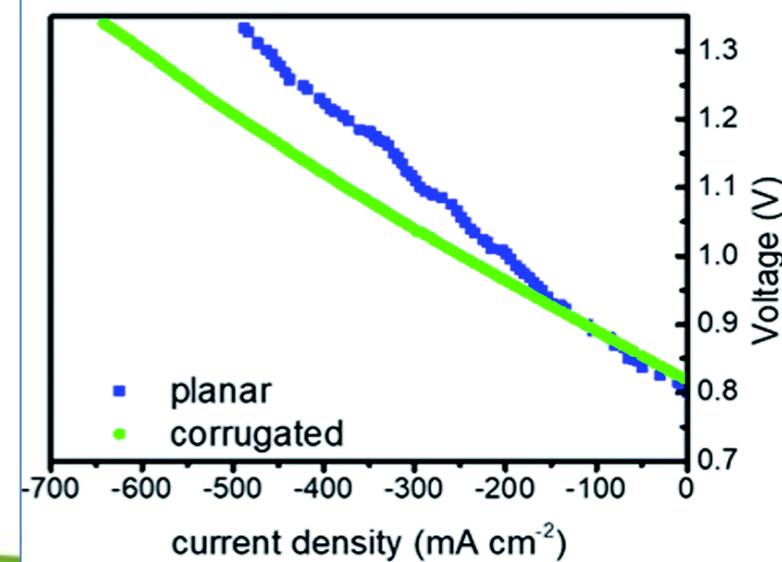
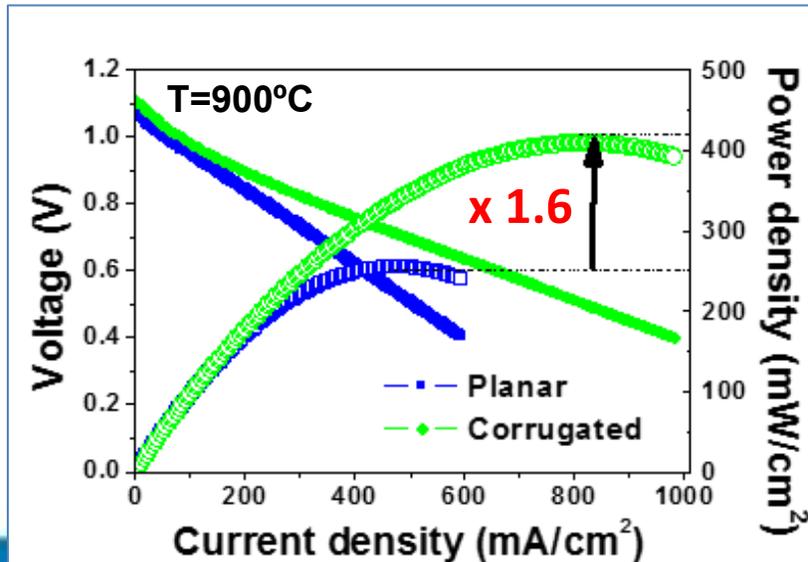
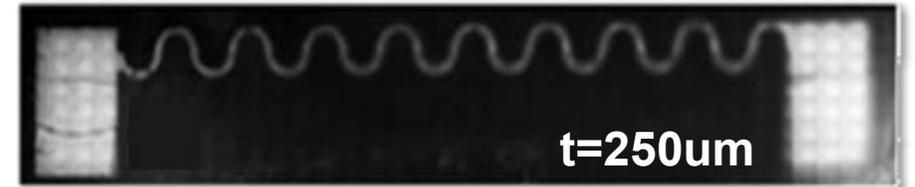
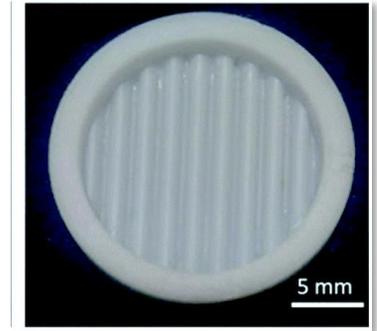
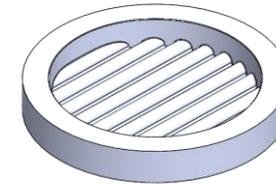
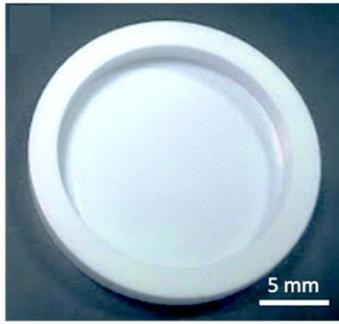
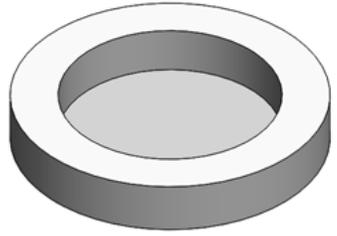
- **High resolution (up to $25\mu\text{m}$);**
- **miniaturized features;**
- **suspended structures;**
- High ceramic load;
- High surface finishing;
- **Large areas;**
- Excellent mechanical properties of the green parts;



3D PRINTED 8YSZ FOR ENHANCED ESCs

8YSZ modified structures

x 1.6



LARGE AREA CORRUGATED ESCs WITH EMBEDDED FUNCTIONALITIES

Cells with 45 cm² projected active area

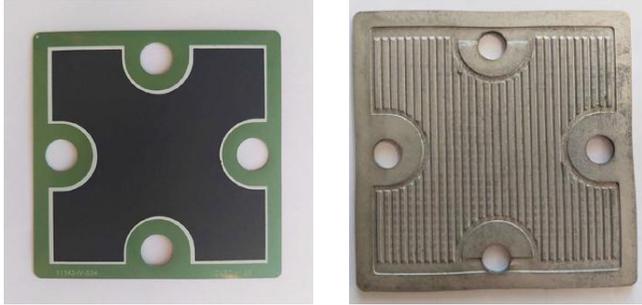


Flat interconnects



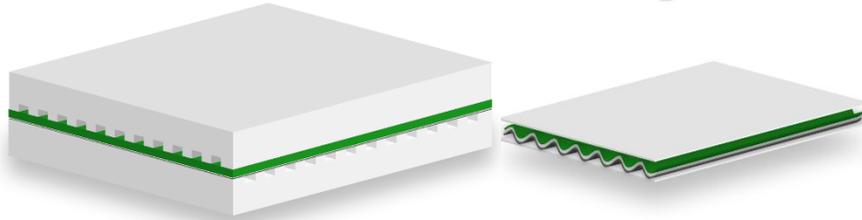
LARGE AREA CORRUGATED ESCs WITH EMBEDDED FUNCTIONALITIES

Conventional



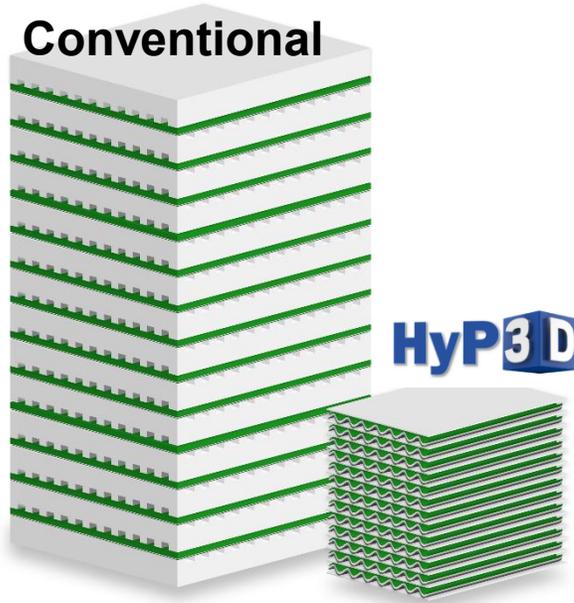
Metallic interconnects can represent up to **50%** of the weight and volume of a stack and up to 35% of the costs.

Conventional



HyP3D

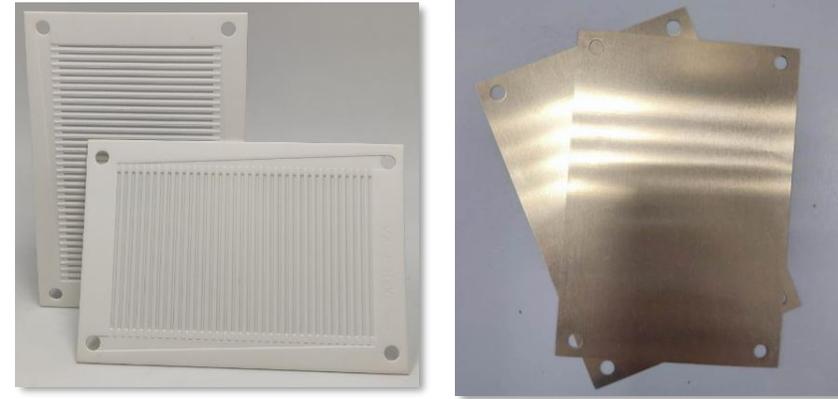
Conventional



HyP3D

SOEC
3 kW/L
1 kW/kg

HyP3D

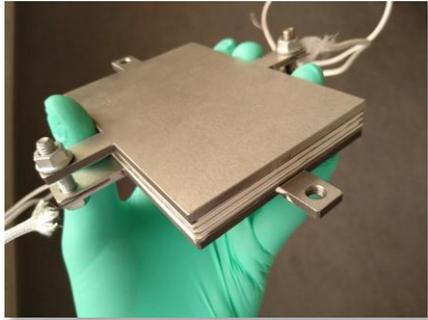


2x-3x volumetric and gravimetric power density respect to SoA

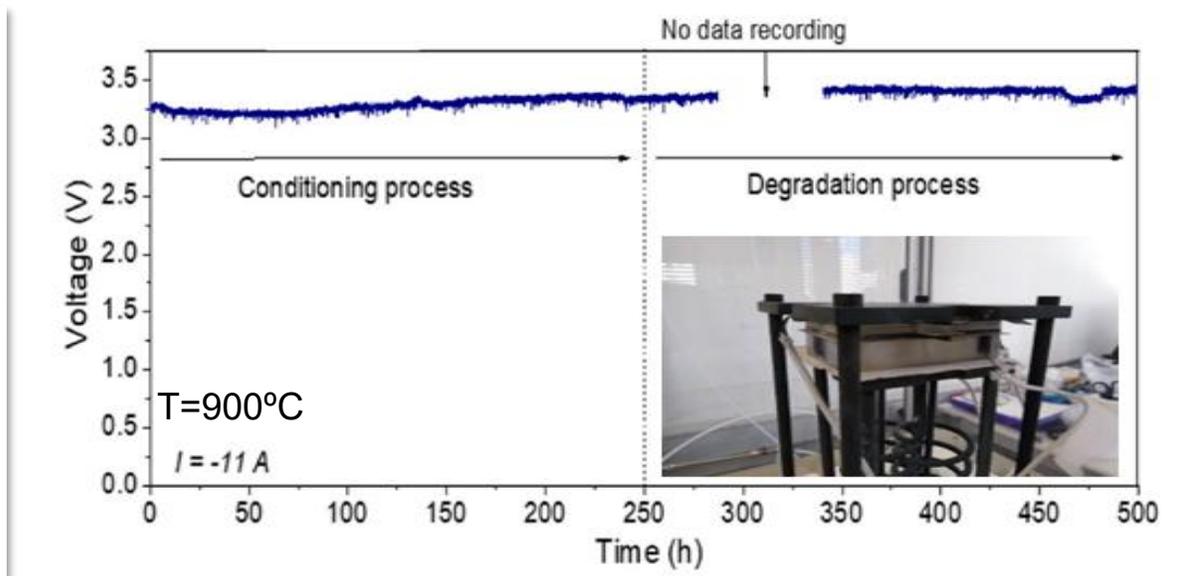
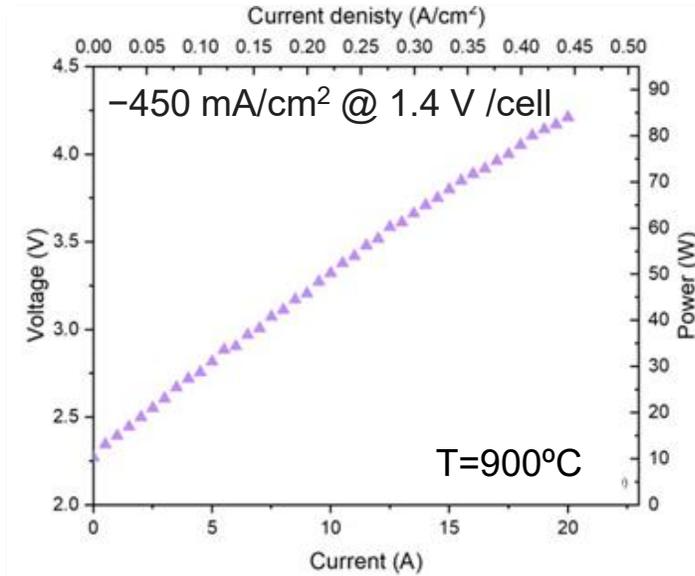


WE BUILT OUR OWN STACKS!

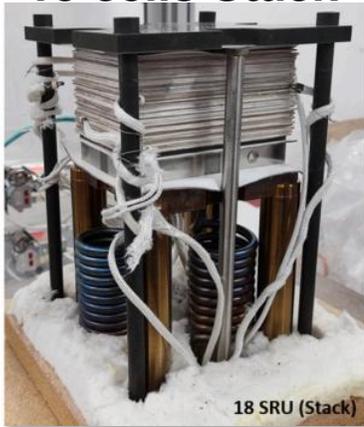
3 cells Short Stack



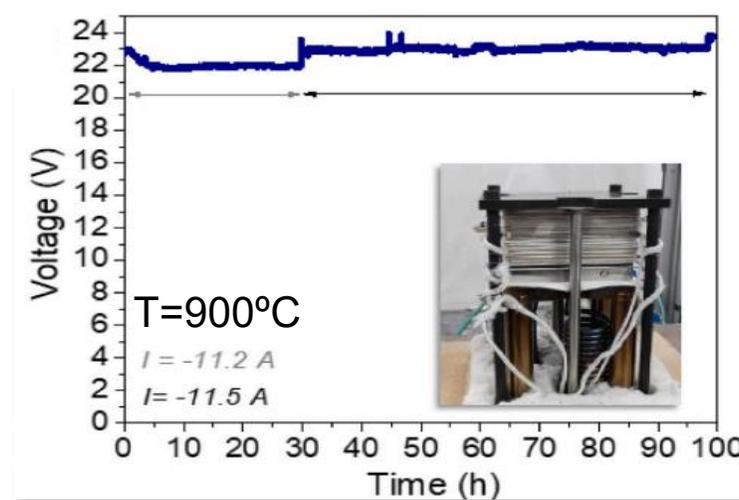
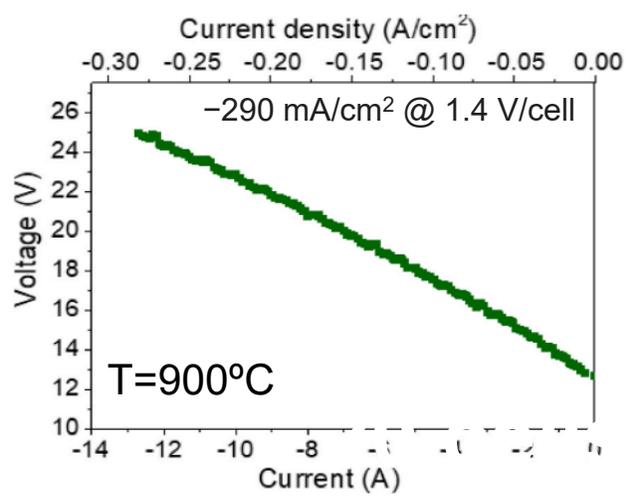
GPD: 0.33 kW/kg
VPD: 0.62 kW/L



18 cells Stack



18 SRU (Stack)



GPD: 0.28 kW/kg
VPD: 0.51 kW/L

NANOIONICS AND FUEL CELLS GROUP



• Visitors are always welcome

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S. Marquez



W. Zambelli

Funded by the European Union (Grant Agreement No. 101101274). Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or Clean Hydrogen Joint Undertaking. Neither the European Union nor the granting authority can be held responsible for them



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