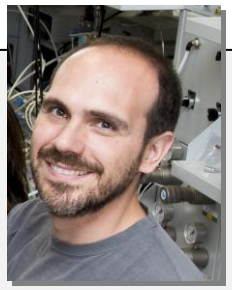
CURRICULUM VITAE

A. PERSONAL INFORMATION



Family name, First name: ***TARANCON, ALBERT***
Date of birth: 15/08/1979
Nationality: Spanish
URL for the group and institutional web sites: www.atlab.es; www.irec.cat
Researcher identifiers: Google Scholar, Albert Tarancón (click here)
ORCID: 0000-0002-1933-2406 (click here)
SCOPUS ID: 42662872000 (click here)

- **Education**

2007 ***PhD in Physics***, "*Summa Cum Laude*", Faculty of Physics, Electronics Dept., UB, ES
2007 ***MEng. in Materials Science***, Materials Department, UPC, ES
2001 ***MSc. Physics***, Faculty of Physics, Electronics Dept., UB, ES

- **Current position**

2024 – present ***Head of Department***, Catalonia Institute for Energy Research (IREC), ES
2018 – present ***ICREA Professor,*** Catalan Institution for Research and Advanced Studies (ICREA), ES
2010 – present ***Head of Group, Nanoionics & Fuel Cells,*** Catalonia Institute for Energy Research (IREC), ES

- **Short biography:**

I hold M.Sc. and PhD in Physics from the University of Barcelona (2001, 2007) and M. Eng. in Materials Science from the Polytechnic University of Catalonia (2007). I worked as research associate at the IMB-CSIC (ES) and as visiting researcher at the University of Oslo (NO), Imperial College London (UK) and Caltech (USA). In 2010, I gained a *Ramon y Cajal Fellowship* and joined the *Catalonia Institute for Energy Research* (IREC) as Head of Group. Since 2018, I am an *ICREA Professor* at IREC and lead a group of 40+ people with an annual budget exceeding €2.5 million devoted to alternative technologies based on solid state ionics and iontronics. I have been PI of 14 EU projects, including one ERC-CoG, one ERC-PoC and four coordinated actions, attracting a total amount of 25+ M€. I am associate editor of J. Phys. Energy (IoP), APL Energy (AIP) and J. Eur. Ceram. Soc. (Elsevier). I am consistently included in the 1% top-cited scientists in the field of "Energy".

Picture of Group headed by Albert at IREC

- **Research Interests:**

I work on advanced materials for energy applications, developing innovative concepts to improve solid-state devices such as SOFC/SOEC, thermoelectric generators, and Li-ion batteries. In recent years, I have focused on the emerging fields of Nanoionics and Iontronics, which explore how size effects and interfaces govern mass transfer and storage, much like Nanoelectronics transformed charge transport. My group is pioneering interface-dominated nanomaterials for radically new device functionalities. I received an ERC Consolidator Grant to implement disruptive Nanoionics concepts in Si-integrated micro-SOFCs and coordinated two FET Proactive projects on novel micro-energy technologies. From this activity, my team developed unprecedented synaptic transistors based on oxide-ion conductors within the Transionics ERC-PoC project, marking the beginning of a new class of switchable devices that may drive the coming "Ion Age."

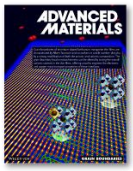
Panoramic view of the nanofabrication corner of the ATlab at IREC

B. KEY RESEARCH ACHIEVEMENTS[†]

1. Discovery of new ionic-conducting materials: Since the beginning of my career, I have dedicated significant efforts to developing new materials for solid-state energy devices. My pioneering work on layered perovskites for solid oxide fuel cell cathodes has accumulated over **3,000 citations** in the past decade. Recently, my group has focused on compositionally complex oxides with features induced by configurational disorder (high entropy). Among other effects, we discovered the outstanding long-term stability of interface-induced highly disordered perovskites, marking a significant advancement in the use of thin films for commercial solid oxide cells (I was granted a **patent** on this concept, WO2024017941).

- **Paper**: *Advances in layered oxide cathodes for intermediate solid oxide fuel cells*, **AT***, MB*, JS, SJS, JAK*, ***J. Mater. Chem*** 20 (2010) 3799 (**551 citations**). **Highlighted** in the cover page of the issue. Included in the **1% worldwide top cited papers** in the field of Materials Science (WOK)
- **Paper**: *Oxygen diffusion in solid oxide fuel cell cathode and electrolyte materials: mechanistic insights from atomistic simulations, AC*, BY*, **AT***, DP, JAK*, ***Energy Environ. Sci.*** 8 (2011) 2774. Included in the **1% worldwide top cited papers** in the field of Materials Science (WOK-ESI) (**509 citations**)
- **Paper**: *A high-entropy manganite in an ordered nanocomposite for long-term application in solid oxide cells,* FB, FC, MA, DD, DP, JS, XW, AC, AM, HW, AC, JMD, **AT*** ***Nature Comm.*** 12 (2021) 2660 (**89 citations**)

2. Breakthroughs in engineering interfaces of ionic conductors: After establishing my research group in 2010, I focused on thin film functional oxides, particularly on the poorly understood role of interfaces. My work revealed a remarkable three-to-five orders of magnitude increase in oxygen mass transport properties within the grain boundaries of perovskite oxides, transforming the nature of these materials for interface-dominated microstructures. My group has published several papers detailing these unique findings, defining tuning strategies, extending the concept to other compositions, and explaining the origin of this new effect.



- **Paper**: *Engineering mixed ionic electronic conduction in $La_{0.8}Sr_{0.2}MnO_{3+\delta}$ nanostructures through fast grain boundary oxygen diffusivity,* AMS, DP, AM, AC, JAK, MB, **AT***, ***Adv. Energy. Mat*** 5 (2015) 1500377. Selected for the **cover of the issue.** (**116 citations**)
- **Paper**: *Engineering Transport in Manganites by Tuning Local Nonstoichiometry in Grain Boundaries* FC, IG, LC, GM, AR, MW, LR, AK, MN, AM, SE, AC, FP, **AT***, ***Adv. Mater.*** 4 (2019) 1805360. Selected for the **cover of the issue** (**65 citations**)

3. Development of new characterization tools for ion mass transport: My interest in interface-dominated materials made me realize the lack of tools for proper characterization of mass transport properties at the nanoscale and in operando devices. My group has developed groundbreaking tools for the direct visualization and quantification of ion mass transport with high spatial resolution, using a novel approach based on Atom Probe Tomography coupled with SIMS. Additionally, we have created methods for online monitoring of redox reactions in electrochemical cells, utilizing Operando Spectroscopic Ellipsometry and Tip Enhanced Raman Spectroscopy. This work is conducted in direct collaboration with **HORIBA**. These methods are a turning point in the field, and I expect a broad adoption in the next decade.

- **Paper**: *Direct measurement of oxygen mass transport at the nanoscale,* FB*, FC, DD, AC, LY, LLC, AM, SE, FP, AA, **AT***, ***Adv. Mater*** 33 (2021) 2105622 (**24 citations**)
- **Paper**: *Operando probing of Li-ion insertion into $LiMn_2O_4$ cathodes by spectroscopic ellipsometry,* AM*, VL, FC, MN, RT, MS, **AT**, ***J. Mater. Chem. A*** 8 (2020) 11538 (**19 citations**). Selected for the **cover of the issue**.

HORIBA
Explore the future

4. High throughput experiments and creation of an open database for machine learning: Over the past five years, my group developed a high-throughput methodology for fabricating and characterizing material libraries synthesized via combinatorial PLD. This enabled us to create a continuous composition map for the $La_{0.8}Sr_{0.2}(Mn,Co,Fe)O_3$ family, generating over 2,000 experimental datasets on structural, compositional, and functional properties. The data and machine learning models predicting electrochemical performance of the family are available to the community, demonstrating my commitment to Open Data Science.

- **Open Database**: Database of structural properties and performance of high-entropy perovskites with composition $La_{0.8}Sr_{0.2}Mn_xCo_yFe_zO_{3\pm\delta}$ (https://nanoionicshub.github.io/LSMCF_database/).
- **Paper**: *Performance prediction of high-entropy perovskites $La_{0.8}Sr_{0.2}Mn_xCo_yFe_zO_{3\pm\delta}$ with automated high-throughput characterization of combinatorial libraries and machine learning*, CBG*, JS, GC, SF, SPG, FC, CC, LL, MN, AC, FB, AA, GD, JAK, AM, FB, AAG*, **AT***, ***Adv. Mater.*** 36 (2024) 2407372 (**12 citations**)
- **Paper**: *Developing machine learning for heterogeneous catalysis with experimental and computational data*, CBG*, SPG,CC, **AT***, AAG*, ***Nature Rev. Chem.*** 9 (2025) 601 **(20 citations)**

[†] All the citations refers to the Google Scholar. Asterisk indicates the corresponding authors. The acronym AT holds for Albert Tarancón.

5. Integration of thin film oxides in electrochemical devices: My group has a proven history of integrating thin films into silicon technology for device miniaturization, some of these devices were pioneering in their class, such as full-ceramic micro-SOFCs. More recently, we extended this implementation to bulk devices opening new avenues for enhanced performance and drastic reduction of critical raw materials employed in energy technologies. This research resulted in several granted **patents** (EP4310966A1, WO2025132616)

- **Paper**: *Full ceramic microSOFCs: towards more reliable MEMS power generators operating at high temperatures,* IG, DP, AM, LF, NS, **AT***, ***Energy Environ. Sci.*** 7 (2014) 3617. Selected for the **cover of the issue** **(103 citations**)
- **Paper:** Enhanced diffusion barrier layers for avoiding degradation in SOFCs aged for 14000 h during 2 years, LB*, JSR, LY, SE, FP, DM, MT, AM*, **AT***, J. Power Sources 555 (2023) 232400 (**48 citations**)

6. Disruptive thermoelectric micro-generators based on nanostructured silicon: In 2012, I published the first integration of silicon nanowires in a thermoelectric microgenerator. Over the past decade, my group has gained a deep understanding of thermal properties in nanostructures, culminating in a novel, cost-effective, and scalable thermoelectric generator based on silicon nanotubes. This research has resulted in several **patents** (WO2016198712, WO2011121163).

- **Paper**: *Large-area and adaptable electrospun Si-based thermoelectric nanomaterials with high energy conversion efficiency,* AM*, MP, GG, CF,DC, AC, **AT**, ***Nature Comm.*** 9 (2018) 4759 (**94 citations)**

7. Proof-of-concept of the IONAGE transistor from my previous ERC-CoG and ERC-PoC grants: During my **ULTRASOFC** ERC-CoG grant, I developed an ultrafast thin-film oxide-ion conductor, paving the way for a new family of low-temperature ionic devices. Driven by my inclination to create devices based on novel effects and materials, I proposed and validated a novel oxide-ion transistor concept during my **TRANSIONICS** ERC-PoC, resulting in a patent. This work demonstrated the potential of such a new device concept while highlighted the need for substantial improvements at device level to reach sub-microsecond operation at room temperature and a deeper understanding of the impact of oxygen stoichiometry on the functional properties of oxides. This initial device serves as the foundation for the current **IONAGE** proposal.

- **Patent:** *Electronic Transistor.* **AT**, FC, IG, NA, AM, YT, Ref: WO2022263659 (2021), Assignees: IREC, ICREA.
- **Paper**: Solid-state oxide-ion synaptic transistor for analog computing, PL, FC*, PN, NA, LM, CBG, AM, **AT***, ***Advanced Materials***, 37 (2024) 2415743

8. Innovation leadership in 3D printing emerging technologies: I have been globally leading the development of 3D printing technologies for energy applications, including editing the first book on the topic and creating a dedicated roadmap in 2022. In 2016, I established a long-term alliance with a ceramic 3D printer manufacturer to jointly develop differential 3D-printed SOFC technology. This collaboration has involved various steps, such as publishing seminal papers and securing intellectual property rights through **patents** (e.g., WO2023021217, WO2024115506). We have now reached the stage where our focus is on technology transfer. A fabrication pilot line was launched in 2025 following the licensing of our technology to an electrolysis company, and we registered our own **spin-off** (**OXHYD**, February 2026).

- **Book**: *3D printing for energy applications*, Edited by **AT** and VE, **Wiley** 2021, DOI:10.1002/9781119560807
- **Paper**: *3D printing the next generation of enhanced solid oxide fuel and electrolysis cells,* AP, AH, MN, AM, MT, **AT***, ***J. Mater. Chem. A*** 8 (2020) 16926. **Selected as HOT PAPER** (**150 citations**)
- **Spinoff company**: **OXHYD**, dedicated to 3D-printed SOFC stacks for Data Centers and Maritime sectors

9. Coordination of the HARVESTORE flagship and EPISTORE projects: I successfully coordinated a community of excellent researchers (Harvestore: 7M€ budget, 13 partners from 7 countries; Epistore: 4.6M€, 15 partners from 8 countries), maximizing impact by publishing over 100 papers and generating 150 communications. Disruptive concepts, such as rechargeable oxygen batteries emerged from the project:

- **Patent:** *Secondary cells.* FB, **AT**, AM, JF, AS, MK, Ref: WO2023213905 (2023), Assignees: TUW, IREC, ICREA

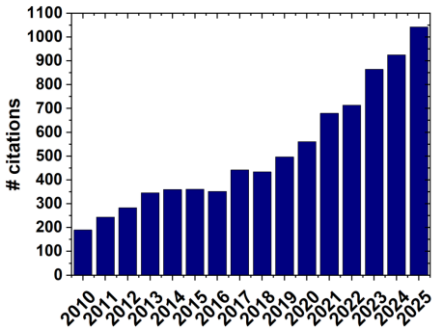
10. International leadership in Solid State Ionics: I have twice organized the biannual European SSI symposium (EMRS 2018 and 2021) and delivered keynotes at the International SSI (2017 Padova, 2019 Seul, 2022 Boston, 2024 London, 700+ attendees on average). I also I chaired the European Fuel Cell Forum (Lucerne) in 2024, the leading global event on Solid Oxide Cells. Finally, By the end of 2025, I was appointed President of the International Conference on Electroceramics (ICE) series, succeeding the distinguished Prof. Harry Tuller (MIT), who launched the series in 2003.

C. PEER RECOGNITION

1. Peer-reviewed publications, highlighted articles and attracted citations

During my career, my work has been continuously evaluated and validated by peers, recognizing the quality of the research carried out by me and my group (since 2010). In this regard, I have published ***eight book chapters, two books and more than 230 scientific publications (163 peer-reviewed articles)***, most of which in prestigious interdisciplinary journals or well-reputed journals of my field. My publications have been ***cited more than 9000 times*** click here for a real-time update) and I hold **h-index≥50** (i10-index≥143). These publications include collaborations with some of the most renowned institutes in the world such as MIT (USA), University of Cambridge (UK) or Imperial College London (UK). Moreover, ***22 of my papers have received more than 100 citations*** (figuring myself *as first* or *corresponding author* in 13 of them). The list of my last publications includes several papers in prestigious multidisciplinary journals (see table) and, in recognition of their relevance, some of them have been highlighted in different ways. Five of them were selected as "hot papers" and seven were selected as cover images of the corresponding issues (*Energy Environ. Sci., Adv. Mater., Adv. Energy Mater., Nano Energy and J. Mater. Chem. A*).

- **Citation-impact**: ***My name is in the list of the 1% worldwide top-cited scientists in the field of "Energy",*** as reported in the prestigious career-long citation-impact ranking by Prof. Ionnadis (Standford)‡.



Distribution of citations/year

Publications in multidisciplinary prestigious journals	
Journal Title	# articles
Nature Reviews Chemistry	1
Advanced Materials	3
Energy and Environmental Science	3
Nature Electronics	1
Advanced Energy Materials	1
Advanced Functional Materials	2
Nano Energy	4
Nature Communications	2
Journal of Materials Chemistry A	19

2. Keynotes and invited talks, seminars and position papers

I have co-authored over 180 oral contributions to international congresses, including more than ***75+ invited talks and 16+ keynotes***. I am particularly honoured to have been invited to give ***keynote speeches and plenary talks at conferences organized by prestigious scientific societies*** such as the European Materials Research Society (EMRS), the International Society for Solid State Ionics (ISSI), the American Ceramic Society (ACERS), and the European Ceramic Society (ECERS). My research's significant impact and influential position have also led to invitations to present at renowned universities and research institutions, including the Max Planck Institute (Germany), the University of Cambridge (UK), Imperial College London (UK), ETH Zurich (Switzerland) and NASA (USA). In recent years, I have also been ***invited to write several editorials, perspectives, and position papers*** on various topics. Moreover, I have had the privilege of coordinating contributions from esteemed colleagues, recognizing my leadership within different research communities.

- **Keynote:** *Towards the Next Generation of Solid Oxide Cells and Stacks,* **47th Intl. Conference and Expo on Advanced Ceramics and Composites-ICACC**, American Ceramic Society, USA, 2023
- **Keynote:** *Thin films for solid-state ionics and iontronics devices*, **XVIII Conference and Exhibition of the European Ceramic Society-ECERS**, European Ceramic Society, Lyon, France, 2023
- **Keynote:** *The beginning of the Ion Age*, **24th International Conference of Solid State Ionics (SSI-24)**, International Society for Solid State Ionics, London, UK, 2024

- **Invited review:** *Three-dimensional printing of components and functional devices for energy and environmental applications,* JR*, **AT***, JC*, JM, LH, PA, JM, RF, ***Energy Environ. Sci.,*** 4 (2017), 843. Included in the **1% worldwide top cited papers** in the field of Materials Science (WOK-ESI) (**354 citations**)
- **Invited editorial:** *Powering the IoT revolution with heat*, **AT***, ***Nature Electronics*** 2 (2019), 270 (**92 citations**)
- **Roadmap:** *Roadmap on 3D printing for Energy,* ***J.Phys.Energy*** 4 (2022) 011501. **AT*** and 29 co-authors (**67 citations**)

‡ Ioannidis et al. *Updated science-wide author databases of standardized citation indicators*. PLoS Biol 18 (2020) e3000918

3. Fellowships and awards

Throughout my career, I have been awarded competitive ***fellowships*** evaluated by peers, maintaining economic independence since my PhD. In 2010, I received the prestigious "*Ramón y Cajal*" grant, the most prestigious postdoctoral fellowship in Spain, which enabled me to establish my own group at IREC, a research institute founded in 2009. After years of dedication to building my research group and labs through competitive funding, including an ERC CoG awarded in 2016, I was honoured with an ICREA Professorship in 2018, an internationally recognized excellent talent attraction program in Catalonia. My group has also held the SGR Consolidated Research Group Label since 2018.

Beyond fellowships, my work has been recognized by various international scientific societies with several ***awards*** for specific papers and presentations at conferences, including the *Solid State Ionics* (SSI) and *International Thermoelectric Society* (ITS) best paper awards, as well as the "*Christian Friederich Schoenbein Bronze Medal*" from the European Fuel Cell Forum. Additionally, my contributions have been acknowledged by the *Fuel Cells and Hydrogen Joint Undertaking*, which manages an EU funding for hydrogen technologies of more than 1300M€, and the Solar Impulse Foundation, both of which have awarded my work for innovation in developing emerging technologies.

- **Recognition:** ***ICREA Professorship*** *(the most prestigious in Catalonia), 2018-present*
- **Award:** ***"Solar Impulse Efficient Solution" award***, Solar Impulse Foundation, 2020
- **Prize:** ***Best Innovation Prize***, European Commission, 2018 and 2024

4. Organization of conferences, editorial services and advisory committees

Due to my gradually achieved leading position in the international community, I have participated in organizing several international symposia and conferences at various levels, including roles as conference chair, organizing committee member, and scientific committee member. Notably, I organized the *Functional Oxide Thin Film for Advanced Energy and IT Conference Series* (click here), featuring an impressive list of speakers. I also organized multiple editions of the well-established biennial Solid State Ionics symposium at EMRS (2018 and 2021), the 18th European Conference on Thermoelectrics (2022), and served as ***General Chair for the most significant conference on Solid Oxide Technologies, the EFCF held in Luzern in 2024, which attracted over 700 participants***. More recently, in 2025, I was appointed as ***President of the ICE conference series***.

- **Conference Chair**: *16th European SOFC & SOEC Forum* (700+ attendees), Lucerne, Switzerland (2024)
- **Conference organizer**: *18th European Conference on Thermoelectrics* (200+ attendees), BCN, Spain (2022)
- **Symposium organizer:** *EMRS Spring 2018*, Strasbourg, France (3000+ attendees, 225 in my symp.)

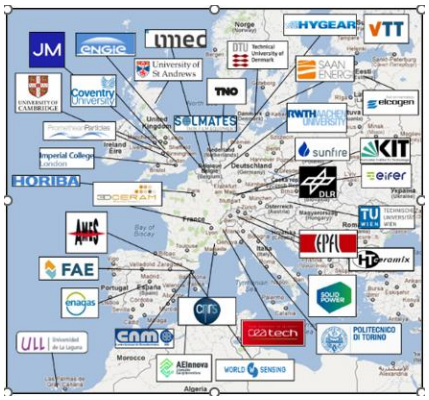
Currently, I am the ***associate editor*** of the prestigious *Journal of the European Ceramic Society* from Elsevier (ranked first in WoS for "Materials Science, Ceramics"), the *Journal of Physics Energy* from IoP (Q1 in "Energy & Fuels"), and the recently launched *APL Energy* from AIP. I have also acted as Guest Editor for Advanced Materials Interfaces (Wiley), Solid State Ionics (Elsevier), and JPhysEnergy (IoP).

- **Associate Editor**: **J. European Ceramic Society (Elsevier)**, IF: 6.2, 2nd in WoS for "*Materials Science, Ceramics*" (2018-present)
- **Editorial board:** **J. Physics: Energy (Institute of Physics)**, IF: 6.3, Q1 in WoS for "*Energy and Fuels*" (2018-present)
- **Editorial board:** **APL Energy (American Institute of Physics)**, open access journal launched in 2023 (2023-present)

Additionally, I have been involved in ***several commissions of trust*** for evaluating research centers (CSIC-MAX programme, Centres of Excellence Programme-Academy of Finland), projects (ERC-EU, FWF-Austria, ANR-France, FNP-Poland, DRC-Netherlands, etc.), permanent positions (DTU-Denmark, PoliTo-Italy, IC2NER-Japan, etc.), and PhD students (Imperial College London-UK, EPFL-Switzerland, CNRS-France, etc.). Finally, I frequently act as member of international advisory boards in conferences such as the EFCF, CIMTEC, ICE, EMRS, ACERS, etc.

5. Success in competitive research funding evaluated by peers

Since 2013, I have been **principal investigator (PI) of 19 competitive research projects** (14 at the EU level including one **1.9 M€ ERC-CoG, one ERC-PoC and four coordinated projects)** and 7 research contracts with industry, attracting **a total amount of 25+ M€.** I have been the coordinator of the **HarveStore (www.harvestore.eu)** flagship EU FET-project (7M€ and 13 partners from 7 countries) devoted to novel thin film based electrochemical cells for energy, which represents a great background for the present application.



My extensive participation in EU projects has resulted in a broad international collaboration network (see attached map). Notably, ***61% of my publications are co-authored with researchers from foreign institutions***. I maintain strong relationships with several prestigious institutes, including Imperial College (UK), Cambridge (UK), Colorado School of Mines (USA), EPFL (CH), IMEC (BE), CNRS (FR), and CSIC (ES).

A **selected list of competitive research projects as PI and Coordinator**:

Project Title	Funding source	Amount (€)	Period	Role
*Development of cost effective manufacturing technologies for key components or fuel cells (**Cell3Ditor**)*	EU-H2020-**JTI-FCH** # 700266	2.180.000 (503.000 IREC)	2016-2020	Coord.
*Breaking the temperature limits of Solid Oxide Fuel Cells: Towards a new family of ultra-thin portable power sources (**ULTRASOFC**)*	H2020-**ERC-CoG** # 681146	1.886.387	2016-2021	Coord.
*Energy HarveStorers for Powering the Internet of Things (**HARVESTORE**)*	EU-H2020-**FETPROACT** # 824072	7.006.200 (964.152 IREC)	2018-2023	Coord.
*Thin Film Reversible SOCs for Ultracompact Electrical Energy Storage (**EpiStore**)*	EU-H2020-**FETPROACT** # 101017709	4.599.130 (682.500 IREC)	2020-2024	Coord.
*Solid-State Ionics Synaptic Transistors for Neuromorphic Computing (**TRANSIONICS**)*	EU-H2020-**ERC-PoC** #101066321	150.000	2022-2023	Coord.
*Hydrogen Production in Pressurized 3D-Printed Solid Oxide Electrolysis Stacks (**HyP3D**)*	EU-Horizon-**CleanH2 JU** #101101274	2.543.399 (643.750 IREC)	2023-2026	Coord.
*Efficient Production of Green Fuel for Maritime Transport Using Co-Electrolysis of CO_2 Captured at Wastewater Treatment Plants (**COMECOCO$_2$**)*	ES-TRANSMISIONES PLEC2024-011072	6.866.115 (766.190 IREC)	2025-2028	Coord.

6. Technology Transfer and Industrial Innovation Activities

My research activity has consistently evolved toward high-impact technological development, resulting in a solid ***track record of industrial collaborations, patented technologies, and technology transfer actions***. Over the last years, I have actively collaborated with major industrial stakeholders such as REPSOL, SOLYDERA, H2B2, TECNICAS REUNIDAS or SNAM, contributed to the maturation of disruptive energy technologies, and promoted the creation of scalable manufacturing routes that bridge fundamental research with market deployment.

- **Industrial contracts**

I have led numerous ***industrial contracts*** aimed at developing proprietary SOFC/SOEC technologies, hydrogen-related solutions, and advanced electrochemical devices. Since 2019, ***these contracts have mobilized more than 2.2 M€ in private investment***.

A **selected list of industrial projects as PI and Coordinator** includes:

Project Title	Funding source	Amount (€)	Period	Role
*Scalable Processes for the Fabrication of Intermediate Temperature SOFC Stacks for Auxiliary Power Units (**SCAPE**)*	REPSOL	145.000	2014-2015	PI
*Development of New Electrolysis Technology Based on 3D-Printed SOEC Cells (**Technopropia**)*	H2B2	850.000	2023-2026	PI

*Research and analysis for the development of proprietary SOEC technology for the generation of efficient hydrogen production systems (**EFISOEC**)*	REPSOL, TR	400.000	2022-2024	PI

- **Prototyping and pilot-line creation**

These industrial projects have been instrumental in translating scientific advances into market-ready prototypes, enabling long-term collaboration agreements and the establishment of shared exploitation strategies. Among other relevant initiatives in this direction, it is relevant to mention the ***creation in 2025 of a manufacturing pilot-line (MERCÈ LAB) for SOC technologies based on 3D printing in close collaboration with 3DCERAM Sinto (FR) and H2B2 (ES) (see image).***

Picture of the MERCE LAB pilot line launched in 2025

- **Patents**

Since 2019, ***my group has added seven patents to its portfolio***, covering breakthrough advances in electrochemical devices, 3D-printed solid oxide cells, freestanding membranes, and oxide-ion neuromorphic transistors. These patents demonstrate the strong innovation capacity of the group and its ability to generate ***transferrable, IP-protected technological assets with high industrial relevance***.

Selected patents in which I am co-inventor include:

- **EP21382543.3 (2022):** Electronic oxide-ion transistor for neuromorphic computing (IREC/ICREA).
- **EP23383322 (2023):** Process for manufacturing freestanding functional electrochemical membranes (IREC/ICREA).
- **EP21382773 (2023):** Integrated 3D-printing system for monolithic SOC stacks (IREC/ICREA).
- **EP22383154 (2023):** Corrugated-membrane SOC stack architecture (H2B2/IREC/ICREA).
- **EP4310966 (2024):** Composite thin-film structures for high-performance electrochemical devices (IREC/ICREA/ Cambridge Enterprise).

- **Spin-off creation (OXHYD)**

In 2026, our sustained efforts in technology valorization crystallized in the ***creation of OXHYD, a deep-tech spin-off dedicated to developing 3D-printed SOFC stacks for data-center and maritime applications***. I am **co-founder** of the company and actively contribute as **Scientific Advisor**, ensuring that the technological roadmap remains fully aligned with the latest advances in the field.

OXHYD was selected to join the ***Collider Programme of the Mobile World Capital (MWC)***, a highly competitive venture-building initiative that accelerates high-impact technology transfer. In recognition of its innovation potential and strategic relevance for the emerging hydrogen and distributed-energy markets, OXHYD was awarded the ***Emergent Prize 2025***, highlighting its leadership among next-generation energy-tech ventures.

7. Contribution to the early careers of excellent researchers

Since 2010, ***I have supervised 38 postdoctoral researchers, 28 PhD students, 23 master's students, and 2 technicians***. In recent years, 16 PhD theses under my supervision have been defended with highest honours (see list below). ***Many of my former students have secured prestigious positions***, expanding our team's international network. For instance, Dr. Dávila obtained a permanent position at IBM-Zurich (CH), Dr. Garbayo leads the Hydrogen Department at CENER (ES), Dr. Tang has a permanent position at Harbin Engineering University (CN), Dr. Gadea is Head of the Nanofab at the Swiss Nanoscience Institute (CH), Dr. Francesco Chiabrera has a permanent position at IREC (ES), Dr. Annelli and Dr. Pla received MSCA fellowships. Conversely, ***our group has attracted outstanding researchers*** who have become permanent members, coming from institutions such as the Max Planck Institute (DE), MIT (US), DTU (DK), University of Washington (US), CEA (FR), and the University of Toronto (CA). **Additionally, I have supervised four MSCA fellowships.**

8. Societal Impact and Policy-Making Contributions

My research activity has consistently aimed to generate not only scientific and technological advances but also ***high-impact contributions to society, engaging with policy-makers, public institutions, and the general public*** to support the transition toward clean energy systems and to promote scientific culture. Over the last years, I have played a visible role in shaping the public narrative on hydrogen, advanced energy technologies, and the future of sustainable power systems.

- **Engagement with Public Institutions and Strategic Policy Documents**

I have actively contributed to several institutional initiatives and policy-oriented actions that guide regional and national strategies in the field of energy:

- ***Contributor to the PROENCAT 2050 Strategic Roadmap (Generalitat de Catalunya):*** Participated in drafting the public strategic document *Prospectiva energètica de Catalunya a l'horitzó 2050 i transició energètica de Catalunya*, specifically in the chapter on **energy storage**, providing technical input on solid-state and hydrogen technologies and helping define long-term energy-transition strategies for Catalonia.
- ***Support to public bodies in energy transition actions*:** Provided expert guidance to the Port of Barcelona, contributing to its first official positioning on clean hydrogen through the workshop *Hydrogen: Towards a Zero-Emission Europe*, attended by more than 100 participants and widely covered by the media.
- ***Author of the Catalan Chapter of the report "Transforming the Energy Mix" for the European Parliament:*** My chapter provided an evidence-based assessment of the challenges and opportunities in Catalonia, outlining actionable policy recommendations to accelerate the deployment of clean-energy infrastructures and to strengthen industrial competitiveness within the EU energy transition framework.

These activities highlight my increasing role as a reference point for energy-related policy development within the Catalan, Spanish and European ecosystems.

- **High-Impact Science Communication and Public Outreach**

Communicating scientific advances to society is a core mission of my group and me. Over the last five years, ***I have carried out numerous outreach actions aimed at public audiences, schools, and the broader community***, focusing on hydrogen, the Internet of Things, 3D printing, next-generation batteries, and gender equality in science. Key activities include:

- ***Hydrogen for a sustainable future*:** Broad audience talks (e.g. *Mondays with Science*) and media interviews (e.g., *La Vanguardia*) explaining the role of hydrogen in the energy transition, together with demonstrations of hydrogen technologies and their societal implications.
- **Inspiring young students and empowering women in energy and STEM**: Delivered an inspirational talk within the *Bojos per l'Energia programme* (Fundació La Pedrera) aimed at highly motivated high-school students; contributed as a scientific mentor to the *Barcelona International Youth Challenge*; and hosted international groups of physics women students to promote research careers in advanced energy technologies.

Through these activities, I have contributed to enhancing scientific literacy and promoting informed societal debate on the technologies shaping the future energy landscape.