

## Press release

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<http://www.efce.org>

### **EFCE presents Thermodynamics and Transport Properties Award to research on sustainable refrigerants to replace environmentally damaging compounds**

**Dr. Carlos Albà I Garriga** is the winner of the 2025 EFCE Excellence Award in Thermodynamics and Transport Properties. He has been selected for his outstanding PhD thesis "*Design of sustainable refrigerants by multiscale modelling*", performed at the University Rovira i Virgili under the supervision of Professor Fèlix L. Llovell Ferret.



Carlos Albà I Garriga obtained his MSc. in Chemical Engineering from the IQS School of Engineering in Barcelona, Spain, and his PhD in Nanoscience, Materials, and Chemical Engineering from the University Rovira i Virgili (URV), Tarragona, Spain. Since December 2024 he holds the position of R&D Engineer at GasN2 in Barcelona, Spain.

Carlos Albà I Garriga's thesis addresses a critical environmental challenge of our time: the need for sustainable refrigerants to replace environmentally damaging compounds, *the high-global-warming-potential (GWP) hydrofluorocarbons (HFCs)*. His work is rooted in advanced thermodynamic modeling, focusing on predicting and optimising properties critical to refrigeration cycles. By leveraging the polar soft-SAFT equation of state, Carlos has developed a robust multiscale modelling framework capable of accurately predicting a variety of thermodynamic properties across a wide range of conditions, reducing the dependence of costly experimental testing in many cases. He has extended the application of molecular theory to design 4th generation drop-in replacements to currently employed refrigerants. Using a multi-criteria assessment (4E analysis) on energy, exergy, environment and economy, he covered a wide range of aspects.

Dr. Albà's research combines theoretical excellence with practical application, creating a multi-scale modelling framework that integrates molecular and process-level insights for the design and evaluation of new refrigerants. This work is timely, given the increasing global focus on reducing the environmental impact of cooling systems in the transportation and building sectors.

The jury of EFCE's Thermodynamics and Transport Properties Working Party selected Dr. Albà I Garriga, among others, for the excellent technical quality of his work and the very clear presentation in his thesis.

His nominator, Professor Fèlix L. Llovell Ferret, said: "During his PhD, Carlos has conducted research stays at prestigious institutions, including ETH Zurich and Khalifa University, Abu Dhabi. These experiences have enriched his research by fostering international collaborations and exposing him to diverse methodologies and advanced facilities. His time at these world-renowned institutions has contributed to the development of innovative approaches in refrigerant design and enhanced the global impact of his research."

The Excellence Award consists of a cash prize of €1500 plus the opportunity to attend the International Conference on Properties and Phase Equilibria for Product and Process Design – PPEPPD 2025 in Bad Gögging, Germany, on 11-15 May 2025, where the award will be presented.

**The Excellence Award is generously sponsored by IFPEN and the EleTher research chair.**



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### **Related links**

EFCE media centre (<https://www.efce.info/News>)

EFCE Working Party on Thermodynamics and Transport Properties  
([https://efce.info/WP\\_TTP.html/](https://efce.info/WP_TTP.html/))

International Conference on Properties and Phase Equilibria for Product and Process Design – PPEPPD 2025 (<https://dechema.de/ppeppd2025.html>)

### **Notes to media**

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## **About chemical engineers**

Chemical, biochemical and process engineering is the application of science, maths and economics to the process of turning raw materials into everyday products. Professional chemical engineers design, construct and manage process operations all over the world. Oil and gas, pharmaceuticals, food and drink, synthetic fibres and clean drinking water are just some of the products where chemical engineering plays a central role.

## **About EFCE**

Founded in 1953, The European Federation of Chemical Engineering (EFCE) is a non-profit-making association, whose object is to promote co-operation in Europe between non-profit-making professional scientific and technical societies in 30 countries for the general advancement of chemical engineering and as a means of furthering the development of chemical engineering. See [www.efce.org](http://www.efce.org)

## **About IFPEN**

IFP Energies nouvelles (IFPEN) is a major research and training player in the fields of energy, transport and the environment. From scientific concepts within the framework of fundamental research, through to technological solutions in the context of applied research, innovation is central to its activities, hinged around four strategic directions: climate, environment and circular economy – renewable energies – sustainable mobility – responsible oil and gas.

As part of the public-interest mission with which it has been tasked by the public authorities, IFPEN focuses its efforts on bringing solutions to the challenges facing society and industry in terms of energy and the climate, to support the ecological transition. An integral part of IFPEN, IFP School, its graduate engineering school, prepares future generations to take up these challenges.

Applied research programs are structured around four strategic priorities:

- climate, environment and circular economy: reducing the impact of human and industrial activities on the climate and the environment;
- renewable energies: producing energy, fuels and chemical intermediates from renewable sources;
- sustainable mobility: developing efficient, environmentally-friendly solutions for the transport sector;
- responsible oil and gas: meeting the demand for energy and chemical products in a more environmentally-friendly manner.

IFPEN thereby contributes to the creation of value by supporting French and European economic activity and the competitiveness of industrial sectors related to mobility, energy, and eco-industry.

See <https://www.ifpenergiesnouvelles.com/>