

Graphene for Sustainable Development

Reducing the Environmental Impact of Coatings, Plastics, and Composites

The French start-up Carbon Waters, based in Pessac near Bordeaux, specializes in the development and production of high-performance advanced materials. Founded in 2017, the company offers a line of ready-to-use, graphene-based additives for the industry. At the heart of Carbon Waters' breakthrough innovation is its unique dispersed graphene production process, for which the company already holds six family patents. Alban Chesneau, co-founder and CEO of Carbon Waters and Nicolas Castet, COO, share insights on the company's technology and its future development plans.

CHEManager: How did Carbon Waters come to be founded — and what does the company's name mean?

Alban Chesneau: Carbon Waters was created in 2017 following a meeting between a technology transfer expert in the chemical sciences, an industrial investor and two researchers from CNRS—the French National Centre for Scientific Research. The project emerged from 15 years of research on carbon nanomaterials at the CNRS, and then at Carbon Waters. Initial work focused on the first method of producing a carbon nanomaterial, graphene, of very high quality directly in “ready-to-use” and stable liquid form in water, hence the name Carbon Waters.

What is unique about your graphene production process and the product lines you offer?

Nicolas Castet: We have developed a patented and scalable technology to produce high quality graphene, a nanomaterial with multiple properties—the lightest, the strongest, the most impermeable material with excellent thermal and electrical conductivity performance—that will contribute to the environmental and energy transition of the industries.

Carbon Waters' graphene is produced in liquid dispersion—not in powder as usually available—for a safer and optimized utilization. Our graphene-based additives are pre-formulated and ready-to-use by industrials for better efficiency and competitiveness.

In which major development areas are you currently active?

N. Castet: After five years of intensive R&D to develop technologies and products, we are in the process of transforming the company into an industrial player. The first production unit will be ready in 2024, while the commercialization of our graphene-based additives for coatings, composites and adhesives begins.

A. Chesneau: In parallel, we are completing our product portfolio by developing new additives for hydrogen storage and batteries applications. On the first topic, we have started multiple technical and industrial collaborations with chemical companies as end-users on graphene-enhanced epoxy and thermoplastics to enhance mechanical, thermal and barrier properties. On the second topic, we are developing new formulations with top academic laboratories to enhance energy density, charging time and fire protection of Li-Ion batteries.

What have been the most exciting projects so far?

N. Castet: Managing an industrial start-up is exciting in many ways! Specifically, receiving positive feedback from customers on new products that took several years of R&D to develop is one of the greatest satisfactions. We just had the case with our new additive for higher thermal stability of epoxy-based materials in composites and adhesives, which was very positively received by the market



Alban Chesneau, CEO, Carbon Waters



Nicolas Castet, COO, Carbon Waters

Carbon Waters has been recognized as a decarbonization start-up in the materials category. What is the reason for this achievement?

A. Chesneau: Decarbonization is what drives us since the foundation of the company. The products will contribute to the decarbonization of the industry by substituting toxic additives in coatings (anticorrosion), by lowering the weight of transports' structure (thermal and mechanical reinforced polymers) and by improving lifespan and performance of batteries and fuel cells.

What's more, our production process is designed to minimize the environmental footprint. Finally, we are strongly involved in the circular economy as we are testing new raw materials from the production with green hydrogen as well as graphite from old battery electrodes for the production of our additives.

What will be the next key steps in the development of the company?

N. Castet: As mentioned earlier, we are taking the company to the industrial scale, with a first production unit that will start up in 2024. Our goal is to increase production capacity more than tenfold to meet customer demand and be cost competitive.

Then, we are working on our commercial development, with orders and contracts that will be signed in the coming months for the first products

PERSONAL PROFILES

Alban Chesneau, co-founder and CEO of Carbon Waters, holds a PhD in Biochemistry and a master's degree in business administration. He is a specialist in technology marketing and strategy with experience accompanying highly innovative businesses. He worked for seven years in innovation and R&D consulting for the chemical and life sciences industries. After meeting two CNRS researchers in 2015, Alban decided to launch Carbon Waters.

Nicolas Castet, COO of Carbon Waters, graduated in economics & finance at the Université de Bordeaux Montesquieu. He joined Carbon Waters in May 2022 after more than 20 years of experience in the chemical industries at multinationals such as Rhodia, Solvay, and Cerdia. He combines commercial & financial expertise in industrial and international environment.

of our portfolio. These include anti-corrosion additives for waterborne and solvent-based coatings — either to boost anticorrosion performance or to substitute existing toxic products — and thermal stability additives, to improve glass transition temperature of epoxy-based material in composites & adhesives.



BUSINESS IDEA

Nanoscale Precision for Macroscale Impacts

The industry is changing, it requires new materials to address environmental & energy transitions by replacing toxic products, increasing lifespan of products and reducing environmental footprint.

Advanced materials are key to tackle these challenges, especially graphene that will play a major role thanks to multiple immense proper-

ties (the lightest, the strongest, the most impermeable, the best electrical and thermal conductive material). Carbon Waters has developed a unique technology to produce high quality graphene in a sustainable and scalable way, to offer ready-to-use products to support the on-going transitions in the industry.

- Carbon Waters, Pessac, France
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ELEVATOR PITCH

Using Carbon to Decarbonize

Global industry is facing major challenges in terms of environmental transition, raw materials supply and REACH-type regulations. The use of disruptive innovations is essential to meet these multiple challenges.

This is the context in which Carbon Waters is positioning itself with the implementation of a very high value-added material, graphene, which they are pioneering as a turnkey solution for a wide range of industrial sectors.

Founded in 2017, Carbon Waters produces the next generation of ready-to-use graphene-based performance additives. The process makes it possible to exploit organic materials in a completely new way for use in cutting-edge industry, while reconciling biosourcing and recyclability.

Their team of 16 people works hand in hand with customers of all sizes from all around the world to meet their strategic challenges. The company has demonstrated the major impact of their products on the on-going environmental and energy transition.

Carbon Waters is now entering the industrialization phase, to meet growing commercial demand and plan to significantly increase production in the coming months/years.

Milestones

2008 – 2014

- Several patents filed on an innovative process for producing graphene-based nanomaterials

2015 – 2017

- project maturation phase

- Carbon Waters start-up founded at the end of 2017

2018

- first funds raised

2019

- Carbon Waters moves in a high-tech research center at the heart of the University of Bordeaux

2020

- Launch of a design office and development of the first prototypes

2022

- further fund-raising to build a pre-industrial site

Roadmap

2024

- First production unit to achieve a 3 tons capacity of additives (used at 0,1%)
- Customer qualification of waterborne and solventborne coating additives and first sales
- Launch of additive for Li-Ion cathodes enhancement project

2025

- Increase to 15 tons production capacity
- Customer qualification of thermosets additives

2026

- Increase to 50 tons production capacity
- International development
- Customer qualification of battery additives



Graph'Up, Carbon Waters' graphene-based performance additives range.