



Innovation in miniaturisation and sustainable manufacturing processes

Best practice category

Strengthening manufacturing capacities, chemicals and equipment, Partner collaboration and open ecosystems

Stakeholder group

SMEs and start-ups, Research and Academia

Value chain position

Equipment, Fabrication, R&D

General Information

AlixLabs AB is a Swedish semiconductor equipment startup and an innovative player in the European semiconductor supply chain, founded in 2019 and specialising in the development of advanced technologies for the fabrication of nanometric structures. Thanks to its patented APS™ method (Atomic Layer Etch Pitch Splitting), the company enables the energy-efficient and sustainable production of nanostructures below **20 nm**, contributing to innovation in the most advanced technology nodes.

Founded in a university environment, AlixLabs operates in the RISE Pronano laboratories at Lund University in **Sweden**, integrating academic research and industrial application. The team is made up of **PhDs** in **inorganic chemistry, physics** and **mathematics**, ensuring a strong link between advanced scientific expertise and applied technological development.

Activities and best practices

- AlixLabs is the only company in the world that specialises exclusively in **Atomic Layer Etching (ALE)**. It develops **APS™ (Atomic Layer Etch Pitch Splitting)** technology, an advanced **ALE** process that allows nanometric structures on semiconductor wafers to be divided into even smaller components, with critical dimensions smaller than 10 nm. The method exploits the unique sidewall properties of nanostructures as topographic masks, enabling precise, efficient and gentle production on silicon, dielectrics and materials such as gallium phosphide (**GaP**). **APS™** is useful for continuing to reduce the size of chip components according to Moore's law, reducing cost and manufacturing complexity compared to multiple lithography processes. The method is complementary to existing lithography techniques (**DUV, EUV, SADP and SAQP**), but offers a simpler, sustainable and less environmentally impactful alternative, making it strategic for the production of new generation integrated circuits and memories.

- International recognition and strategic collaborations highlight AlixLabs' role as an innovative and influential player in the semiconductor value chain. The success of APS™ technology was rewarded at the IC Taiwan Grand Challenge 2025, where AlixLabs stood out among more than **150** international startups, highlighting the global impact of solutions developed for chip miniaturisation and sustainable manufacturing. In addition AlixLabs was recognised for the third time in a row in the EE Times Silicon 100, consolidating its position among the most innovative semiconductor startups globally and confirming the importance of European innovation in the sector.
- In parallel, the company collaborates with NSS Water and Fraunhofer IPMS in a project co-funded by ASCENT+ to develop sustainable solutions in **ultrapure water (UPW)** management for chip manufacturing. This project helps reduce water consumption, chemical use and environmental impact by integrating advanced metrology and innovative recycling processes for semiconductor fabrication.
- Alixlab is constantly strengthening its academic and scientific dimension through strategic collaborations, such as the one it started with Linköping University, to explore joint research on advanced materials such as **gallium nitride (GaN)** and **indium nitride (InN)**. This collaboration allows the exchange of know-how, synergies between laboratories and the advancement of research on semiconductors for **RF** and **power electronics applications**, key sectors for EU climate objectives.
- Since 2023, AlixLabs has participated in the European project ALL2GaN, an initiative that aims to develop advanced **gallium nitride (GaN)** based technologies for more efficient and sustainable power devices. The project responds to the objectives of the European Green Deal, contributing to the reduction of energy consumption and green technological innovation and involves 45 partners in 12 countries, covering the entire value chain from research and production to integration and industrial use cases.

Challenges addressed with this practice

AlixLabs responds to the crucial challenges in the semiconductor sector related to the miniaturisation of components and the sustainability of production processes. Its innovative technology reduces manufacturing complexity and costs, offering a more efficient and less impactful alternative to traditional lithographic techniques.

Close cooperation with academia, particularly universities such as Lund and Linköping, facilitates the transfer of knowledge and the development of specialist skills, expanding the possibilities of application also to advanced materials and new market segments, such as power electronics. By participating in major European projects, AlixLabs contributes to innovation in the sector, supporting energy efficiency and sustainability objectives, in line with European strategies for a greener and more competitive industry.