

## SimatLab, the research laboratory for modelling future materials, is speeding up its development

- **SimatLab, a public-private research laboratory that brings together Michelin and the Institut de Chimie de Clermont-Ferrand [Clermont-Ferrand Chemical Institute] (ICCF)\*; is renewing its research into modelling future materials for 4 years;**
- **New partners to boost its innovative power;**
- **Lines of research widened to include the medical and hydrogen fields.**



The Simatlab public-private research laboratory, created in 2017 by the Michelin Group and the Clermont-Ferrand Chemical institute (ICCF), is renewing its works on modelling future materials for another four years. Furthermore, the laboratory is speeding up its development by integrating new partners and widening its areas of research to the medical and hydrogen fields.

The CHU de Clermont-Ferrand [University Hospital] becomes the laboratory's new academic partner alongside a new multi-disciplinary team of chemists, physicists, pharmacists, and mathematicians.

SimatLab is also implementing a new pilot structure to host associate members from outside the academic world. This entity will allow for working on ad-hoc research subjects, carried by industrial third parties (SMEs or large groups). This unique structure will increase the laboratory's research capacities by generating a cross-fertilization of subjects and allowing future partners to be identified.

Lastly, Simatlab is developing new working lines in medicine and hydrogen. Systems in the first field are complex as they are comprised of large-size molecules that are difficult to simulate. As for fuel cells, the materials are comprised of molecules that play both a mechanical and chemical role during the conversion of hydrogen into electricity. The research challenges are huge, and the progress made will be beneficial to the issues that are central to the questions of future mobility and personal well-being.

This common laboratory models future materials around three major lines of research:

- a physical and digital approach to the change of scale between that of a molecule (1 nanometer) and that of continuum mechanics (1 micrometer);
- use of simulations to assist the development of innovative materials;
- joint use of the simulation results and experimental data to validate the approaches and enrich these through artificial intelligence.

*"For Michelin, the works of the common SimatLab laboratory are at the heart of the Group's "All Sustainable" strategy. Future materials, medicine, and hydrogen-powered mobility form part of five fields in which Michelin has a strong desire to develop, in, around and beyond the tire. Open innovation and the arrival of new stakeholders will allow for finding the skills that Group needs to achieve its ambitions and overcome the challenges it has set itself for 2050. Lastly, this partnership once again demonstrates the roots and involvement of our company in the region", explains Christophe Moriceau, Advanced Research Director for the Michelin Group.*

For the Université Clermont Auvergne, the research carried out within SimatLab allows for developing robust and predictive molecular simulation methodologies that are tested at a practical level directly in industry. The opening to other disciplines and to the consortium of companies will allow for uniting around the multi-scale simulation of polymers and for encouraging interdisciplinary studies while developing the drawing power of the site at Clermont alongside a major industrial group.

*“The renewal of the SimatLab common laboratory, as well as the widening of topics that will be tackled there, is embedded in the CNRS’ mission to contribute to national economic and industrial development, by encouraging exchanges between the research world and industry. This collaboration around SimatLab, centered on the simulation of polymers, comes within the framework of a wider collaboration undertaken with the Michelin group that encourages the diversity of skills, especially in relation to the ecological transition. This partnership with Michelin allows us in particular to assess, on concrete applications, the stability of the methodologies developed in the labs and thus to encourage research with a high industrial return,”* explains Jean-Luc Moullet, Associate CEO for Innovation at the CNRS [French National Center for Scientific Research].

*“Highly invested in the Auvergne region for organizing treatment channels and managing medical resources, the University Hospital is delighted to join the SimatLab common laboratory. This partnership is a true accelerator for research into medical devices through its innovative approach to the simulation of materials, thus allowing for the material-fluid interface phenomena to be understood and described. It is a shared and virtuous project that will play a major role in treating patients by participating in the development of future medical devices. This scientific ambition, based around the principles of discussion, the search for synergies, and highlighting specific assets, will also allow for developing research into the sustainability and biocompatibility of the materials,”* analyzed Valérie Sautou, Vice Chair of the University Hospital’s Clinical Research and Innovation Delegation.

\*The ICCF is a laboratory from the Université Clermont Auvergne and the CNRS

## SimatLab in figures

**Year created:** 2017

**Partners:** Michelin, Université Clermont Auvergne (UCA), CNRS, CHU Clermont-Ferrand, Institut de Chimie de Clermont-Ferrand (ICCF), SIGMA Clermont

**Team:**

- 12 permanent researchers (6 Michelin, 3 UCA, 2 CHU and 1 CNRS)
- 9 non-permanent researchers (4 theses, of which 2 CIFRE, 3 post-doctorate, 1 CHU internship thesis and 1 CNRS tenure track)

**Budget:** EUR 2.6M (2017-2021) and EUR 3.8M (2022-2025)

**Notable facts:**

- 7 publications in reading committee journals and 5 in the process of being submitted.
- 3 calculation codes transferred to Michelin engineers
- 6 new analysis methodologies
- Organization of a conference at the European Center for Atomic and Molecular Calculations, planned for June 2022
- Contribution to international conferences
- Multiple actions to popularize science: science day, Nuées ardentes, etc.

## About Michelin

Michelin's ambition is to sustainably improve its customers' mobility. The leader in the mobility sector, Michelin designs, manufactures, and distributes the tires best suited to their requirements and uses as well as services and solutions to improve transport efficacy. Michelin also puts forward offers that allow its customers to enjoy unique moments when traveling. Michelin also develops high-technology equipment intended for multiple fields. Based in Clermont-Ferrand, Michelin is present in 170 countries, employs 123,600 people and operates 71 tire factories that, together, produced approximately 170 million tires in 2020. ([www.michelin.com](http://www.michelin.com)).

## About the Université Clermont Auvergne

The Université Clermont Auvergne is a multi-disciplinary university anchored in its region and open to the world. With a rich history and diversity, the UCA has positioned itself as an essential stakeholder in the Auvergne region with a regional, national, and international influence.

Awarded Etablissement Public Expérimental [Experimental Public Establishment] status on January 1, 2021, the UCA provides a multi-disciplinary, international, and diversified teaching offer allowing economic and social challenges to be met and aiming at supporting students in achieving their goals.

The I-Site label obtained in February 2017 through **the CAP 20-25 project** places the UCA on the map of further education and research excellence, both nationally and internationally. Double degrees (48 in 2020), international masters, mechanisms for assisting with mobility when entering and leaving, excellence grants, etc. - a wide range of initiatives aimed at opening our students and our region to the world. From a research and innovation point of view, the UCA's **CAP 20-25 project** supports in particular the mobility of university lecturers and researchers, doctoral students and staff, the hosting of internationally renowned guest professors, the creation of summer schools and even the organization of conferences on an international scale.

## About the CNRS

The National Center for Scientific Research is one of the most important research institutions in the world. In order to overcome the major present-day and future challenges, its scientists explore life, matter, the Universe, and how human societies function. Internationally recognized for the excellence of its scientific works, the CNRS is as much a reference in the research and development world as it is for the general public.

## About the CHU Clermont-Ferrand

Clermont-Ferrand University Hospital shines in its threefold mission: treatment, research, and teaching. Its fundamental, complementary, and inseparable objectives are to favor quality and safety in treatments, prevent risks and follow an ethical and deontological approach while respecting the principles of laity within the CHU. With over 8,000 agents, CHU Clermont Ferrand is the 2<sup>nd</sup> largest employer in the former Auvergne region and the #1 public employer.

The reference healthcare establishment in the west of the Auvergne-Rhône-Alpes region, the CHU was designated the coordinator for the "Auvergne regions" hospitals association member establishments. (<https://www.chu-clermontferrand.fr/>)

## Photos and/or attachments available on:

<https://contentcenter.michelin.com:443/portal/shared-board/f645599f-7e59-48ed-bb5e-89bd6f7a3ef4>

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