

Press release

Albi, April 11, 2024

## **Pioneering research on the decarbonization of industry by IMT Mines Albi professor Ange Nzihou receives €2.5 million in funding from the highly selective Horizon Europe ERC (European Research Council) program**

Heavy industry (e.g. heavy chemicals, incineration, cement works, steel works) accounts for **36%** of its CO<sub>2</sub> emissions per year in Europe. While there are currently no solutions for reducing them, the research led by Ange Nzihou, professor at IMT Mines Albi, is about to revolutionize this area by converting waste heat (>550°C) into energy and storing it to make it available for use thanks to a biobased carbon material. The highly selective and prestigious ERC Advanced Grant (€2.5m) awarded to Ange Nzihou on April 11, 2024, aims to help make this scientific and technological breakthrough a reality. The goal is to develop this decarbonization solution for heavy industry within five years.

### **Major technological breakthroughs to fight global warming**

STOREHEAT, the project led by Professor Ange Nzihou, aims to create a virtuous circle by using emissions that have negative environmental impacts to meet energy needs by tapping into the potential of biobased carbon.

Ange Nzihou's research removes several technological barriers:

- **Recovery of high-temperature waste heat >550°C** from heavy industry: there are not currently any sustainable materials that can recover and store this heat, other than silicon carbide (SiC) and a few rare ceramics, which have very high environmental impacts\*. The STOREHEAT project makes it possible to manufacture a locally produced biobased carbon material using biomass and biowaste, without preempting food resources.
- **Energy storage:** the properties of this biobased material make it possible to store energy in the form of heat and reuse it as needed in the form of heat or electricity. This ability to manage intermittent needs is truly revolutionary.
- **Decarbonizing high-temperature industry:** there are currently no sustainable solutions for reducing the 36% of CO<sub>2</sub> emissions generated by heavy industry. The STOREHEAT project

includes a major societal component, not only by providing this solution, but by doing so at a reduced cost (production costs eight times less than SiC), eliminating dependence on rare metals, recovering locally available residues, and creating a new renewable energy source.

*\* Producing 1kg of silicon carbide emits 430g of CO<sub>2</sub> and requires graphite (produced from coal or petroleum coke), which itself emits 4,900g of CO<sub>2</sub> per kilo of silicon carbide produced.*

## **€2.5 million in European grant funds for developing biobased carbon materials and their use in high environmental impacts industry**

The STOREHEAT project on “innovative and sustainable carbon-based materials for the storage of sensitive high-temperature thermal energy” led by Ange Nzihou, professor at IMT Mines Albi, has been awarded an ERC Advanced Grant, making it eligible for European funding with a maximum budget of €2.5 million that can be allocated to each laureate. This funding granted for a five-year period aims to provide a deeper understanding of the formation of biobased carbon materials and support the development of an industrial-scale pilot solution.

This funding is particularly selective, considering that the STOREHEAT project, presented in the field of “Materials Engineering”, is one of the 255 projects selected from among the 1,829 projects submitted by researchers from 19 countries. It is one of the 37 French projects selected, placing France in third position behind Germany and England.

## **A program that funds pioneering work led by exceptional researchers**

ERC Advanced Grants are awarded by the European Research Council (ERC). It is the most prestigious European scientific program. The goal is to fund pioneering research up to the early stages of commercialization. The only selection criterion for laureates is scientific excellence. As stated in the press release announcing ERC Advanced Grants results for 2024, “**selection is open to all confirmed researchers, recognized as exceptional leaders and who are conducting an exploratory research project.**”

## **World-class expertise reaching as far as Princeton University**

Ange Nzihou is a pioneer in waste valorization and energy transition solutions. His research has led to the creation of new mechanisms for energy production from biomass and biowaste. The researcher from IMT Mines Albi’s Research Center for Process Engineering of Divided Solids, Energy and the Environment (RAPSODEE UMR CNRS 5302), where he served as director for nine years, is the leader of an international scientific community dedicated to this line of research. He is one of the most influential researchers in the world, according to the prestigious ranking by Stanford University. Since 2022, he has contributed his expertise to the prestigious Princeton University as a Fellow Professor at the [Andlinger Center for Energy and Environment](#) , where he leads the scientific theme on sustainable carbon materials. This collaboration is in keeping with the American laboratory’s goal to position itself as a leader in R&D on renewable energies, environmental protection and climate change.

## IMT Mines Albi's RAPSODEE UMR CNRS 5302 Research Center is one of the most advanced in Europe

The development of biobased carbon materials is one of the scientific themes pursued by IMT Mines Albi's RAPSODEE UMR CNRS 5302 Research Center. Its research community is working to substitute renewable carbon for fossil carbon and to develop technologies that produce low-carbon energy and help decarbonize industry. These technologies integrate resource depletion and availability issues, including for rare earths, nickel and cobalt.

The dynamic nature of scientific publications on biobased carbon materials by IMT Mines Albi's RAPSODEE Research Center positions it among the best national and international centers.



*“The prestigious support from the European Research Council provides a great opportunity for structuring the work on sustainable carbon materials at international level. IMT Mines Albi's RAPSODEE Research Center, a joint CNRS research unit, is among the most advanced in the world in this field, especially in the area of biobased carbon materials. This recognized expertise and the scientific breakthrough proposed by the STOREHEAT project were a decisive factor in obtaining this European funding, along with the societal component of the project: reduce the 36% of CO<sub>2</sub> emissions generated by heavy industry, for which no solution currently exists, and recover the wasted heat, which is the equivalent of 16% of Europe's total annual heat consumption.”*

**Ange Nzihou, professor at RAPSODEE UMR 532 CNRS IMT Mines Albi, Fellow professor at [Andlinger Center for Energy and the Environment](#), Princeton University**

### About us:

#### **IMT Mines Albi – Pursue innovation, entrepreneurship and a sustainable future.**

*IMT Mines Albi forme des ingénieurs généralistes, innovants, humanistes et internationaux qui intègrent dans leurs actions et leur management la dynamique du développement durable.*

*Former des ingénieurs rigoureux, entreprenants, capables de dynamiser les entreprises. Inventer de nouveaux produits et procédés grâce à des recherches de pointe. Les développer avec des partenaires industriels, et contribuer ainsi à l'expansion économique de notre territoire... Telles sont les missions d'IMT Mines Albi.*

*En symbiose avec son environnement IMT Mines Albi a choisi de se spécialiser sur des créneaux d'expertise, à la fois originaux et porteurs : matériaux et procédés pour l'aéronautique et le spatial, valorisation énergétique de la biomasse et des déchets, nouvelles technologies de mise en forme des médicaments, cinétique des organisations.*

*Dans ces domaines, l'école a su attirer à Albi des enseignants et chercheurs de renom, dont les travaux sont reconnus à l'échelle internationale. Les entreprises bénéficient de leur soutien et d'outils scientifiques uniques à l'échelle de la région, permettant de tester la faisabilité de nouveaux produits et procédés.*

*Les formations IMT Mines Albi, sont de plus en plus diversifiées, avec des cursus ingénieurs par apprentissage et des masters internationaux qui ne cessent de se développer à côté de la formation étudiante post classes préparatoires, s'appuient aussi sur ces expertises.*

*Depuis décembre 2019, IMT Mines Albi est certifiée ISO 9001 pour l'ensemble de ses activités.*

*IMT Mines Albi est une école de l'Institut Mines-Télécom (IMT). L'IMT est le 1<sup>er</sup> groupe public d'écoles d'ingénieurs et de management en France. 10 grandes écoles d'ingénieurs et de management constituent ensemble l'IMT. La force du groupe repose*

sur la complémentarité de ses écoles et leur cohésion, fondée sur leur raison d'être commune « Ensemble pour imaginer et construire un avenir durable et former ses acteurs ».  
Leurs activités se déploient dans les domaines liés aux grandes transitions numérique, énergétique, industrielle et éducative.  
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