

THE MONTHLY LIST

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LIST TECHNOLOGY IDENTIFIES ADVERSE EFFECTS OF FOOD ADDITIVE E171 ON THE IMMUNE SYSTEM

The effects of exposure to food additive E171 have been evidenced thanks to LIST-based technology and skills. These nanoparticles were identified through LIST expertise and the findings have attracted media attention in the whole continent. The publication prompts regulators to reflect on banning this additive from toothpaste and confectionery. This breakthrough is in line with the European goal of studying the future of nanoparticles in our environment. It also stands as a testimony of LIST's dedication as an RTO to improve quality of life.

From left to right: Anais Chauvière, Jean-Nicolas Audinot, Patrick Grysan and Esther Lentzen

Researchers from the Luxembourg Institute of Science and Technology (LIST), teaming up with Institut national de la recherche agronomique Toulouse (Inra) and other partners, have studied the effects of oral exposure to titanium dioxide. Titanium dioxide is a food additive (E171) commonly used in foodstuffs, especially confectionery. It is used by the food industry because it enhances the shiny aspect of toothpaste and confectionery and helps maintain their coloured aspect, but has absolutely no nutritional added value.

Results observed and analysed at LIST have shown for the first time that E171 crosses the intestinal barrier in animals and reaches other parts of the body. Using samples sent by Inra, LIST's secondary ion mass spectrometry (SIMS) experts were able to detect and locate traces of E171 nanoparticles in the small intestine and the colon.

The researchers also showed that chronic oral exposure to the additive spontaneously induced non-malignant stage of carcinogenesis, in 40% of exposed animals. The findings were published in the January issue of Scientific Reports and have widely been reported about, in many newspapers such as le Canard Enchaîné, le Monde, Libération, or the Russian network REN TV, who went to LIST premises to interview our researcher Jean-Nicolas Audinot.

In order to successfully complete this study, Inra made particular use of LIST's cutting-edge toxicological microanalysis know-how. The toxicology study carried out at LIST is not only unique in Luxembourg but also very little developed, with 40 machines around the world. This type of analysis can be also conducted for other environmental, cosmetic or pharmacological applications.

LIST is fully in line with the European goal of studying the future of nanoparticles in our environment. The high standard and the societal impact of such research also have to be highlighted, illustrating the institute's ambition and achievements as a Research and Technology Organisation. The findings can contribute to a better quality of life in Europe and Luxembourg. A few prominent confectionery manufacturers have pledged to remove E171 from their products since the findings were published. Furthermore, regulators in France are now thinking of banning E171 use in toothpaste and confectionery, and other authorities could think of similar moves in the neighbouring countries.

OTHER HIGHLIGHTS



Europe

LIST AND ESA SET OUT TO REINVENT LAUNCH PHASES OF SPACECRAFT

Within the framework of the collaborative agreement between the European Space Agency (ESA) and LIST, the nanomaterials / nanotechnology unit of the Institute is studying the integration of graphene on commercial copper sheet, in order to provide first evidence on the concept of flexible supercapacitors of low weight, which could help to revolutionise the launch phases of spacecraft. The graphene is a bi-dimensional monofilament of carbon atoms, extracted for the first time in 2004 only, which earned the Nobel Prize to the physicists who made this discovery. The first demonstrators are expected for the month of September 2017. LIST and ESA may be writing a new chapter in the common history of Luxembourg and the space conquest! [Learn more on www.list.lu](http://www.list.lu)

Scientific excellence

RENOWNED HYDROLOGY EXPERT PROF. DR. JEFFREY MCDONNELL AT LIST

In the light of past achievements made through joint research projects, LIST is pleased to host UNESCO award winner, hydrologist Jeff McDonnell on four exciting new research avenues in the domain of eco-hydrology. Prof. McDonnell is enthusiastic about the collaboration: "Luxembourg offers an exceptional setting with the best outdoor water laboratory and LIST's water group is at the forefront of research," declared the scientist. "The unique situation of LIST, where water and nanotechnology research are housed under the same roof, offers a rare and unrivalled opportunity for collaboration." [Learn more on www.list.lu](http://www.list.lu)



Building

LIST LAUNCHES PROJECT ON COLLABORATIVE DECISION SUPPORT FOR BUILDING

On 08 February 2017, the 4DCollab project (Usage and interaction of synchronous 4D simulation for collaborative decision support in Architecture, Engineering and Construction) held its kickoff meeting at the Luxembourg Institute of Science and Technology (LIST) - Belval. 4Dcollab is a research project co-funded by the Agence Nationale de la Recherche and the Luxembourg National Research Fund. It aims at defining innovative collaborative construction work practices, enabling multi-disciplinary decision-making through novel interaction techniques with 4D/Building Information Modelling models. The project team will focus its work on emergent practices related to collaboration enhanced with 4D models (3D+Time), new natural interactions techniques based on a prospective ergonomics approach. [Learn more on www.list.lu](http://www.list.lu)

Education

LIST TO CHALLENGE STUDENTS' BUSINESS CREATIVITY AT MORPHEUS CUP

LIST encourages European students to share their ideas or start-up projects in the fields of circular economy, nanomaterials and data analytics by sponsoring three new awards at the European "Morpheus Cup", which will take part at the Belval Research & Innovation Campus, on 28 April 2017. European students are invited to compete for the prize individually or in a team by submitting a ten-slide project. This initiative will not only support Luxembourg's efforts in raising awareness for science and innovation, but will also allow LIST to attract European talents nationally and throughout the EU, while creating incentives for students to contribute actively to the scientific and economic landscapes of the future. [Learn more on www.list.lu](http://www.list.lu)



WHERE TOMORROW BEGINS

Located at the heart of Belval's Research & Innovation Campus, LIST can ideally connect its over 500 specialists in materials, environment and IT, including its more than 70 PhD students, through a broad range of joint projects, programmes and partnerships with virtually all of Luxembourg's other major research players. At Belval, the University of Luxembourg, LIH, LISER, Technoport, Luxinnovation and the Luxembourg National Research Fund are all literally within arm's reach.

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