

# Paving the Way for Sustainable Infection Control

## Membrane-mimetic Coating Based on Self-assembly Nanotechnology Prevents Biofilm Formation

*LipoCoat is a biotech company specialized in ‘bio-inspired’ coatings that improve the safety, comfort, and performance of medical devices with a focus on health and nutrition. The pipeline comprises discovery and (pre)-clinical programs in the medical device and drug discovery space. Established in September 2016, the start-up’s ambition is to become a leading biotech company dedicated to improving health and well-being through the discovery, development, and commercialization of novel surface solutions. Jasper van Weerd, founder & CEO, takes us on LipoCoat’s journey.*

**CHEManager:** Mr. van Weerd, LipoCoat was founded 5 years ago. How did it all start?

**Jasper van Weerd:** LipoCoat was founded in late 2016 and is a spin-off company from the MESA+ Institute of Nanotechnology at the University of Twente, the Netherlands. The company is based on my research conducted between 2010 and 2014. At the time, I was a PhD student under supervision of professors Pascal Jonkheijm and Marcel Karperien. I took inspiration from nature and developed a biomaterial coating platform.

**What got you excited about the results of your research that then turned into a spin-off company?**

**J. van Weerd:** The coating mimics the cell membrane in such a way that surfaces in watery environments can exhibit anti-stick properties, thus preventing such occurrences as microbial build-up. This innovation was patented and LipoCoat landed its first strategic partner for a rigid contact lens coating in the same year it was incorporated.

The past years, LipoCoat’s team grew fast and secured growth funding, built its own lab facility on the innovation campus of the University of Twente, became ISO 13485-certified and received many accolades for its works. Furthermore, LipoCoat was selected to join the Johnson & Johnson JLABS incubator program.

**What kind of support did you receive right after the start and which**

**obstacles did you have to master so far?**

**J. van Weerd:** In the lead-up to founding the company, a lot of business development support was provided by the University of Twente and the grant program NanoNextNL. They enabled the first steps. Furthermore, LipoCoat made use of so-called valorization grants, subsidies, and loans to fund our prototype development. A major challenge when developing medtech innovations is funding. We were able to manage this challenge by having a seasoned management team and by relying on the start-up ecosystem.

**What is the USP or differentiating feature of your ‘bio-inspired’ coatings?**

**J. van Weerd:** Our mission is to make healthcare better by improving the comfort, performance and safety of medical devices enabled by our coating. LipoCoat’s innovation is a bio-inspired coating technology that prevents biofilm formation to reduce healthcare associated infections — HAI. Current solutions that address these infections often rely on the use of antimicrobial compounds, such as antibiotics embedded in the biomaterial or applied as surface coating. In general, these solutions do not solve the unmet need for infection control and are associated with drawbacks, such as increased usage of antibiotics, which causes the risk of antibiotic resistance, and ecotoxicity and patient toxicity. LipoCoat, on the other hand, offers a passive



Jasper van Weerd, LipoCoat

approach to infection control without the need for antimicrobial compounds. Our solution could pave the way for sustainable infection control.

**Which application areas do you focus on?**

**J. van Weerd:** The Covid-19 pandemic shows the importance of scientific progress in regard to infection control. Luckily, our coatings have a wide range of applications, including medical devices, R&D tools, in vitro diagnostics — IVDs — food and pharma. LipoCoat has been able to design additional features into the coating next to the anti-fouling properties such a lubricity improvement, widening its scope. We are aiming to launch LipoCoat-enabled contact lenses in the course of 2021 and in a few years’ time, we expect our first coated catheters to enter the market. In addition, other use cases are actively explored in our discovery programs, including R&D tools, cell culture systems, cosmetic and therapeutic applications.

**What has been the most exciting project so far?**

**J. van Weerd:** In Q1 2021, LipoCoat was selected from 1,700 candidates

### PERSONAL PROFILE

**Jasper van Weerd**, founder & CEO of LipoCoat, holds a Bachelor in Applied Science from Saxion Hogeschool Enschede (University of Applied Sciences), in the Netherlands, and a Masters in Biomedical Engineering from the University of Twente. He is credited with authoring or co-authoring 11 internationally acclaimed, peer reviewed scientific papers. In addition, he was a visiting researcher at Penn State University. He worked for 2 years on the EU Hibiscus project. This included work at Universities in the Netherlands, Italy, and the United Kingdom. From 2010 till 2014 Jasper was engaged with his PhD at the University of Twente, entitled, “Novel Biomedical Applications of Supported Lipid Bilayers”. His PhD has resulted in numerous public awards and credits, evolving into the launch of LipoCoat in 2016.

for the Heraeus Accelerator Program. Heraeus is one of the largest family-owned companies in Germany. Together with the Heraeus Medical Components department, LipoCoat is now evaluating its technology for catheter applications. At the end of the accelerator program, LipoCoat shall present a minimally viable product — that is, an early prototype for evaluation and feedback purposes. Heraeus contributes its know-how and experience in prototype testing and problem solving. Participating in the Heraeus Accelerator Program has been a very rewarding experience so far.

**What will be the next steps to develop your company?**

**J. van Weerd:** To make the leap to further growth, a follow-on funding round of €2 to €3 million is planned for 2021. With this investment round, LipoCoat wants to build its revenue streams, increase its development and production capacity, and expand its international footprint by gaining access to USA and Asian markets.



## BUSINESS IDEA

### The Technology and its Advantages

LipoCoat's innovation is a bio-inspired coating technology that mimics the cell membrane, more specifically the phospholipid bilayer. When applied, the coating self-assembles to form a dynamic, hydrophilic bilipid layer only 5 nm thin. Once it is wet, this lipid layer can demonstrate certain properties simultaneously which can be tuned to the desired expression. With a range of formulations, hydrophilicity, stability, and lubricity can be adjusted to complement the inherent anti-biofouling and anti-thrombogenic nature of the coating. Thus, biocompatible and high-performance medical device coatings can be prepared that may be used in applications such as contact lenses, catheters, and implants.

In nature, the phospholipid bilayers of cells serves as a universal interface between distinct chemical environments. They also regulate the passage of molecules and proteins into and out of the cell essentially acting as a biological 'customs border'. For example, if physical flexibility is a requirement, extra cholesterol inserted into the bilayer can enhance fluidity and proteins can be incorporated to fa-

ilitate specific functions. Hence, LipoCoat mimics the lipid bilayer, retaining its dynamicity. This property enhances coating-stability through the process of regeneration. Small defects such as scratches regenerate spontaneously because molecules reorganize to fill in the gaps.

The team have developed multiple proprietary coatings to exploit these properties and have assembled a toolbox of various base molecules and gathered the know-how to tailor coating composition and architecture to meet application needs. As such, LipoCoat is a membrane-mimetic coating with anti-fouling, wetting and lubricous properties that are introduced by chemical control of the interface composition.

The LipoCoat coatings enable sustainable infection control — no antibiotics, no toxic compounds, no side effects. The coatings are based on self-assembly nanotechnology and are anti-fouling, bio-compatible, hydrophilic, cost-efficient, and scalable. They have a wide range of applications, including medical devices, R&D tools, in vitro diagnostics, food and pharma.

■ LipoCoat BV, Enschede, The Netherlands  
www.lipocoat.com



LipoCoat's headquarters are located at Kennispark Twente in Enschede, the Netherlands, across from the University of Twente campus, where the company also built its own lab facility.

## ELEVATOR PITCH

### Successes, Milestones and Roadmap

LipoCoat was established in September 2016 and is a spin-off company from the MESA+ Institute of Nanotechnology based at the University of Twente, the Netherlands.

Headquarters are located at Kennispark Twente in Enschede, across from the University of Twente campus. By 2017, the company had secured its first seed funding and expanded its management team. By 2019 the company grew to 17 FTE, built its own lab facility across from the University of Twente campus, and became ISO 13485-certified.

In autumn 2019, LipoCoat joined the Johnson & Johnson JLABS incubator program and also has a base at JLABS' facilities in Beerse, Belgium. In 2020, LipoCoat secured a series A investment round and expanded its efforts to include the catheter application.

#### Milestones

■ LipoCoat has won 20+ awards, competitions and grants.

#### 2015

■ Winner of, amongst others, Pitch Holland-Innovative, NanoLabNL Voucher, Jury Award Dragon's Den NNNL

#### 2016

■ Awarded funding by Red Med-tech Ventures  
■ Awarded MIT-Grant RVO

■ Winner of NanoNextNL Valorisation Grant

#### 2017

■ Special Award Business Delegation Tokyo  
■ Awarded H2020 SME-1 Grant  
■ Awarded NWO Take-Off 2 Grant

#### 2018

■ Awarded High-Tech Lease Fund Grant

#### 2019

■ EU Seal of Excellence  
■ Top 30 Global Start-ups — GIST Catalyst  
■ European Biotech Start-up of the Year

#### 2020

■ Best Medical Device Coatings Company of 2020  
■ Raised €1,5 million extra from several investors in April 2020

As of April 2021, the company has raised €4.1 million in total (combination of equity and non-dilutive funding). LipoCoat is always interested in establishing new alliances and partnerships to leverage their strengths: identifying novel applications, expanding the understanding of microbiology, and developing new substrate solutions with innovative modes of action that impact health care and well-being.



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