Dutch and German researchers develop new class of antifouling coating for long-term medical implants

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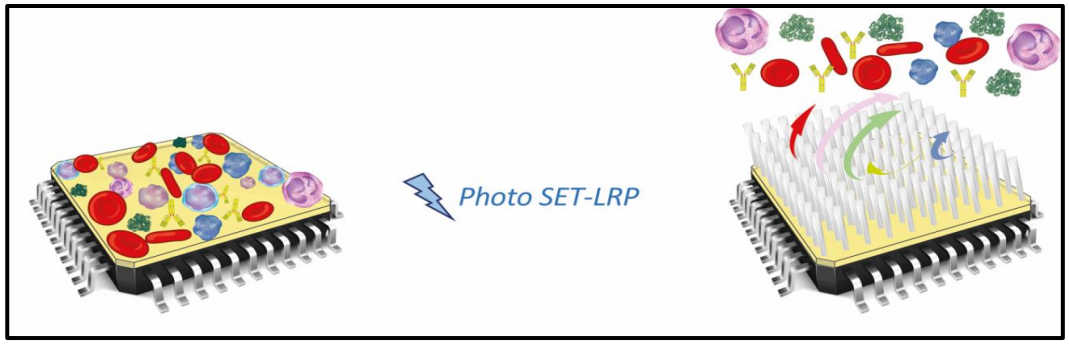
A team of researchers from NovioSense BV (Nijmegen, The Netherlands) and DWI-Leibniz Institute for Interactive Materials (Aachen, Germany) has developed a new class of innovative antifouling materials for use on long-term medical implants. These novel coatings may open the door for implantable, wearable sensors for applications such as an artificial pancreas for Type 1 diabetes. This work is supported by the prestigious Horizon 2020 Marie Skłodowska-Curie Innovative Training Network Biogel (642687).

Treatment of chronic non-communicable diseases is one of the largest challenges facing healthcare systems around the world. Continuous monitoring using wearable sensors linked to cellphones is rapidly becoming a reality. Implantable sensor devices that have long-term compatibility and accuracy while placed within the body are the next logical step in the advancement of this process in order to develop solutions such as a truly self-contained artificial pancreas. "What is innovative about the technologies that we are developing is that we are not only trying to evade the immune system, we are developing a platform that can interface and direct tissue growth around the implant to circumvent the body's encapsulation and isolation process", said NovioSense CEO Dr Christopher Wilson. "This unique approach will allow us to realise long-term implants that can not only resist passively within the body but can interface in a way that accurate and clinically relevant data can be extracted over many months, and maybe even years," continued Dr. Wilson.

The coatings reported today suppress the foreign body response, utilising naturally derived biopolymers functionalized with brush structures that prevent the binding of biomolecules that trigger the formation of a blood clot known as a thrombus, and ultimately isolation of the implant within a fibrous capsule. "The resulting materials show hugely reduced biofouling and could be applied not only to sensors but also passive devices such as stents or catheters," said Irene Buzzacchera, Research Scientist from NovioSense BV. "The brushes act as a barrier, preventing cells and proteins from becoming absorbed while simultaneously creating a soft gel interface," continued Irene.

The coatings are applicable not only to sensors but also as a new method to provide antifouling protection to a variety of medical devices both permeant and transient to the body. "What is unique about the materials is that they are derived from natural materials, can be coated onto almost any substrate and functionalized within 30 minutes, to achieve unmatched resistance to fouling and thrombosis" said Dr. Cesar Rodriguez-Emmenegger, Project Leader from DWI.



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