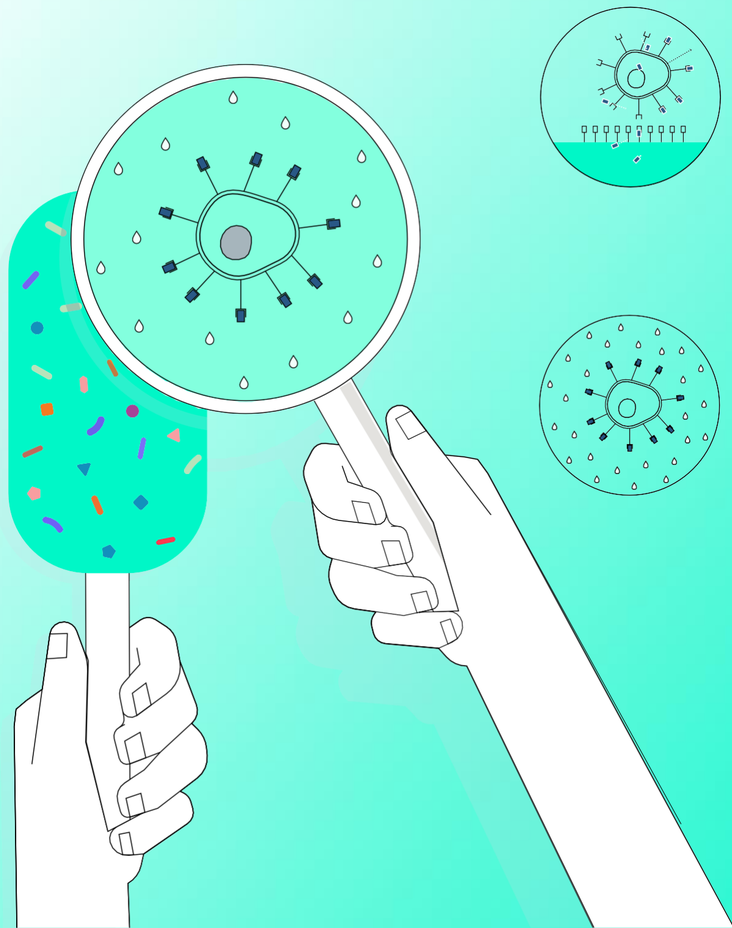
Fraunhofer

Leistungszentrum FUNKTIONSINTEGRATION
bio · phys · chem

„Any biological interaction is based on sugars.“

This quote may be a bit exaggerated, but there is much to support it: Our cells are embedded in a sugar shell that is cell-, tissue- and organ-specific.



Function

Binding Ability

Pathogens such as viruses, bacteria and toxins use sugar to infiltrate our cells. Sugars are thus important building blocks of our immune system and cancer cells change their sugar envelope to metastasize. Materials based on sugar can exploit this diversity of biological communication: for human health.

Physical Sliding Ability

Everything that is slimy on our body gets its sliding ability from sugar and everyone knows how unpleasant dry eyes are. However, lubricity is not the only function of the mucus, also called “Mucus”. Mucus protects the underlying cells from harsh conditions such as stomach juice and is an initial barrier to protect against pathogens or to remove foreign bodies. Materials based on sugar can exploit these physical properties: for bio-based, aqueous lubricants, for medical technology and for self-cleaning surfaces.

USP

Bioinspired & Biomimetic

Sugars are used for communication at the cellular level and have unique biophysical properties. By using sugars for material development, materials science can also benefit from the variety of properties of glycobiotechnology.

Sugar- based, but durable

Sugars provide energy and are quickly broken down. Rather unfavourable for materials, isn’t it? By combining with persistent polymers, the properties of the sugars are preserved, but the shelf life is dramatically prolonged. Heat, extreme pH values, surfactants are not a problem for our glycopolymers, if desired.

Customizable Properties

Sugars can be neutral, positive or negative. From nine building blocks in our body, nature produces countless variants that differ in size, complexity and physical properties. Some of it can be converted into materials. In this way, the physical properties can be adapted as well as the biological detection.

Applications

Gentle Cell Culture

Our cells live in a sugary environment. We imitate this environment with glycopolymers, so that cells are not only cultivated gently, but can even be removed from the surface without proteases such as trypsin. This coating is inexpensive, and can even be customized for your application.

Infection Prevention

Bioanalytics

Non-specific binding of analytes to sensor surfaces is often a problem. Here we use the hydrophilic glycopolymers as an interface to prevent fouling. Sugars can also be used directly as binding molecules, e.g. to analyse pathogen infestation or to identify special biomarkers.

Biological Lubricants

Water-compatible lubricants based on glycopolymers can be used in both technical and medical applications. Even switchable viscosities are conceivable and are being developed.

Contact:

Fraunhofer Institute for Applied Polymer Research (IAP)

Telephone +49 331 568-3203
E-Mail: ruben.rosencrantz@iap.fraunhofer.de
https://www.iap.fraunhofer.de/

Fraunhofer Institute for Cell Therapy and Immunology, Department of Bioanalytics and Bioprocesses (IZI-BB)

Telephone +49 331 58187-306
E-Mail: