From the sea to the clinic, a phytocolloids journey.

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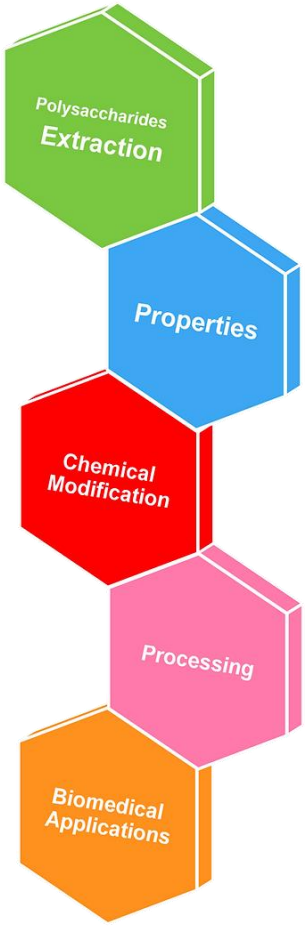

With the increasing growth of the algae industry and the development of algae biorefinery, there is a growing need for high-value applications of algae-extracted biopolymers. The utilization of phytocolloids in the biomedical field can be considered as one of the most attractive applications but is challenging to implement. Historically, polysaccharides extracted from seaweed have been in biomedical research, for example, agarose gels for electrophoresis and bacterial culture.

At the institute for Macromolecular Chemistry in Freiburg, we are considering the entire phytocolloids value chain, to develop diverse biomedical applications including injectables materials, drug delivery systems, wound dressing, and 3D bioprinting. To make a critical impact on the field our approach encompasses the journey of phytocolloids from the algae culture, extraction of polysaccharides extraction, chemical modifications, characterization, processing, and an understanding of the interactions of soft matter with living organisms. In this talk, I will present our global approach starting from the culture and extraction to obtain pure polysaccharides, to the understanding on the phytocolloids structure-properties relationships, chemical modifications, and how these modifications can be used to tune the polysaccharide properties toward a specific application. Along the value adding process, we are using tools and methods that span the whole analytical field from rheology to molecular dynamic. This whole process and passed work will be presented and hope to spark potential collaborations.

INFO & CONTACT

Key publications:

(1) Beaumont, M.; Tran, R.; Vera, G.; Niedrist, D.; Rousset, A.; Pierre, R.; Shastri, V. P.; Forget, A. Hydrogel-Forming Algae Polysaccharides: From Seaweed to Biomedical Applications. *Biomacromolecules* **2021**, acs.biomac.0c01406. https://doi.org/10.1021/acs.biomac.0c01406.

(2) Forget, A.; Christensen, J.; Ludeke, S.; Kohler, E.; Tobias, S.; Matloubi, M.; Thomann, R.; Shastri, V. P. Polysaccharide Hydrogels with Tunable Stiffness and Provasculogenic Properties via -Helix to -Sheet Switch in Secondary Structure. *Proc. Natl. Acad. Sci.* **2013**, *110* (32), 12887–12892. https://doi.org/10.1073/pnas.1222880110.