



## Technology Offer

### Fucoidan extraction and quantification from seawater Means and methods to purify and measure marine fucoidan

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#### Background

Fucoidan is a structurally complex, sulphated polysaccharide produced by brown algae and related groups, with emerging roles in marine carbon cycling and high value in biotechnology and biomedicine. Existing methods focus on extracting fucoidan from algal or animal biomass, were extensive co-extracted biomolecules complicate purification and structural analysis. In contrast, dissolved organic matter in seawater is extremely dilute, and conventional bulk measurements of dissolved organic carbon or total carbohydrates cannot resolve fucoidan specifically. As established biomass-based extraction techniques are not applicable to dilute, salt-rich seawater, ambient fucoidan concentrations and dynamics in the water column have remained largely unknown. A method that can selectively concentrate and quantify fucoidan from seawater is therefore essential for tracing its sources, fate, and bioavailability in marine systems.

#### Technology

Scientists from the Max-Planck-Institute for Marine Microbiology have developed a scalable method to selectively extract and quantify fucoidan directly from seawater by combining an enrichment step with carbohydrate analytics. In one implementation, seawater is passed over an anion-exchange column that binds anionic polysaccharides such as fucoidan, which are eluted at high salt, desalted (e.g., dialysis), and analyzed after acid hydrolysis by HPAEC-PAD monosaccharide profiling to obtain quantitative fucoidan concentrations.

#### Advantages

- Specific enrichment and quantification of fucoidan from seawater, rather than bulk dissolved organic carbon or total carbohydrate pools.
- Discriminates fucoidan from free monosaccharides and other polysaccharides, improving source attribution and structural resolution.
- Scalable extraction from millilitre to litre volumes, enabling both targeted studies and larger environmental surveys.
- Compatible with downstream methods for structural and functional characterization of marine fucoidans.

Applications include quantifying fucoidan release from kelp forests and diatom blooms, tracing fucoidan's contribution to dissolved organic carbon and carbon sequestration, characterizing environmental fucoidan for biotech and pharma sourcing, and validating marine biogeochemical and ecosystem models.

#### Patent Information

The international patent application WO2024133855A1 was filed in 2023.

#### Opportunity

We are open to license agreements and co-development with smartwatch and wearable manufacturers, digital health providers, and health platforms, including joint work on large-scale data collection, model refinement, and integration into existing health and fitness ecosystems.

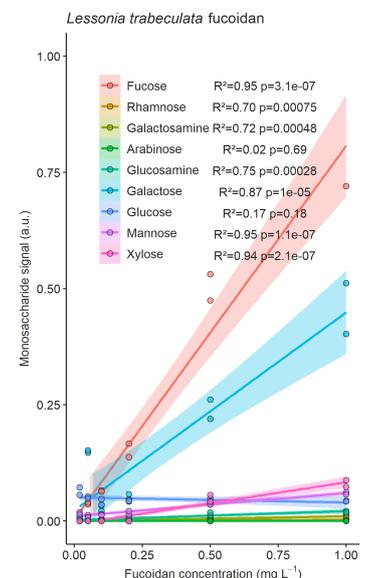


Figure 1 Quantification of fucoidan in seawater.