

**Research line:** Fucoidan from brown seaweeds on the development of biomedical applications

**Research group:** Universidade do Minho - 3B's Research Group (Biomaterials, Biodegradables and Biomimetics)

Fucoidan is a sulfated polysaccharide composed by L-fucose, xylose and glucuronic acid, being present on cell wall of brown seaweeds. The structure of fucoidan is built of (1→3)- or alternating (1→3) and (1→4) linked pyranose units, some of which being sulfated, according to the algae species - Figure 1.

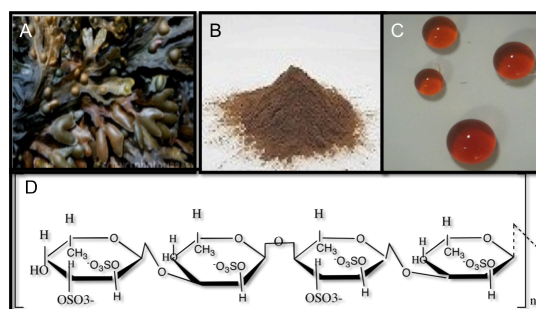
The increasing use of fucoidan is motivated by its interesting bioactive properties, such as anti-oxidative, anticoagulant, anti-inflammatory and antithrombotic effects, among others.

Basically, the process for production of fucoidan from brown algae can be dividing in three steps: i) milling seaweeds, ii) extraction/purification, which involves multiple extended aqueous extractions, acidic solutions and may include addition of calcium to promote the alginate precipitation and iii) dry/careful storage – Figure 2.

Fucoidan, which is a yellow-brown colored powder, dissolves easily in water but does not so in organic solvents. One major obstacle for biomedical applications is the difficulty in scaffolds fabrication because of this high water solubility. For this reason the studies that involve blends and composites based on fucoidan have been increasing along the year, aiming the development of stable structures in aqueous medium.

Within NOVOMAR project, the process to obtain fucoidan insoluble in water and scaffolds with fucoidan alone is being improved. Additionally, the development of biomedical applications based on fucoidan is being pursued, namely:

- Modification of fucoidan based on methacrylation reaction;
- Development of fucoidan based particles following photocrosslinking method;
- Tunable fucoidan-based particles, to be used for drug delivery.



**Figure 1:** A) Brown seaweeds, B) fucoidan powder, C) fucoidan-based particles and D) fucoidan structure.



**Figure 2:** Scheme to obtain fucoidan from brown seaweeds.