

Isolation And Characterization Of Biopolymers From The Ascidian *Styela clava*

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Motivation

Styela clava belongs to the Ascideans, a class of sack-like marine invertebrates characterized by a unique protective tunic around their bodies [1]. The highly crystalline cellulosic nanofibrils present in the tunic are endowed with extraordinary mechanical properties, showing potential as nanometer-size fillers into polymers to produce reinforced nanocomposites. Furthermore, polysaccharides in the body have shown to attenuate metastasis, thrombosis and inflammation; anticoagulation activity has also been reported in galactans extracted from the tunic. The aim of the present study is to isolate biopolymers from *Styela clava*.

Materials and methods

Styela Clava from Muros (Galicia, Spain) is used for biopolymers extraction and characterization. Tunic and body were separated and subjected to different protocols.

Tunic

Tunics were treated with acetone and digested with papain, futher deproteinized with 5% KOH, and finally bleached with CH₃COOH and NaClO (4% Cl) at 60 °C, until the tunics became white. They were washed with deionised water and freeze-dried.

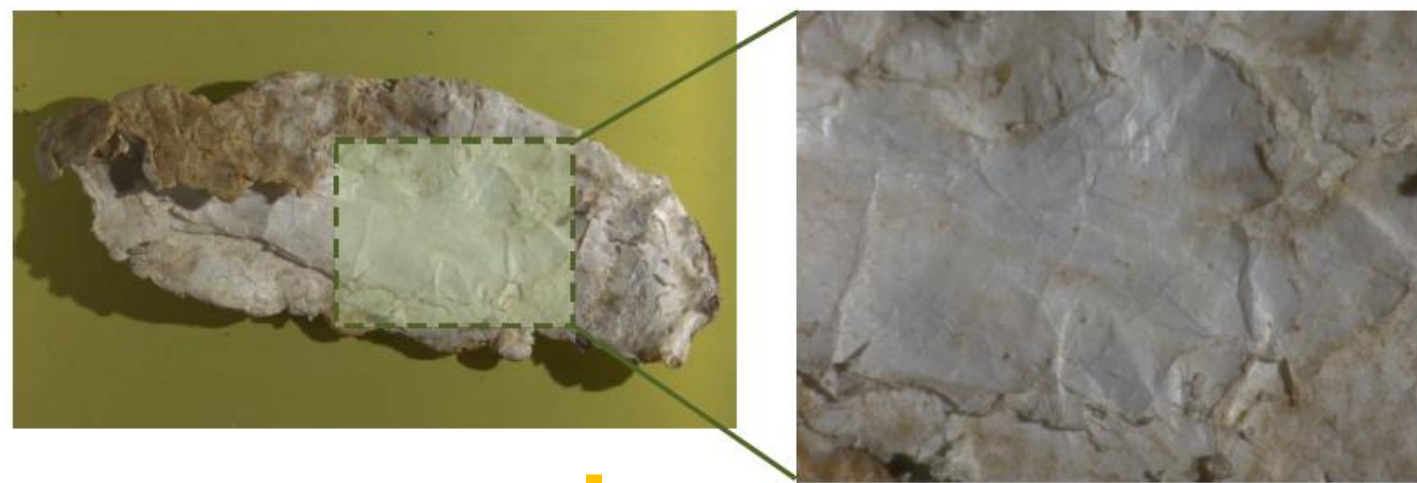
Body

Freeze-dried bodies were digested with papain. The supernatant was precipitated with ethanol (0,8 vol) and 0,6 M NaOH, ultrafiltrated with a 3 kDa membrane and freeze-dried. Molecular weight distribution was determined by GPC.

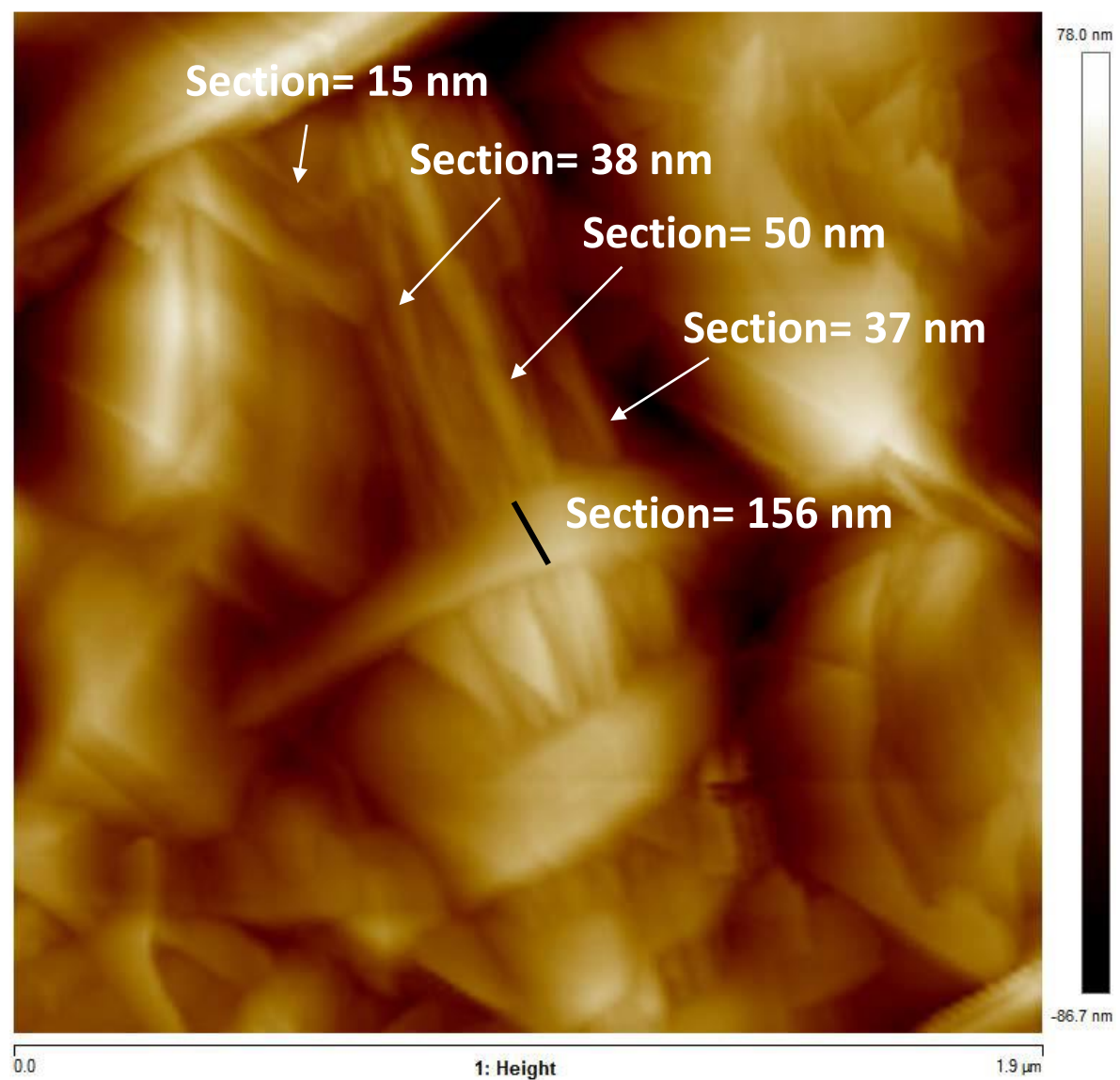
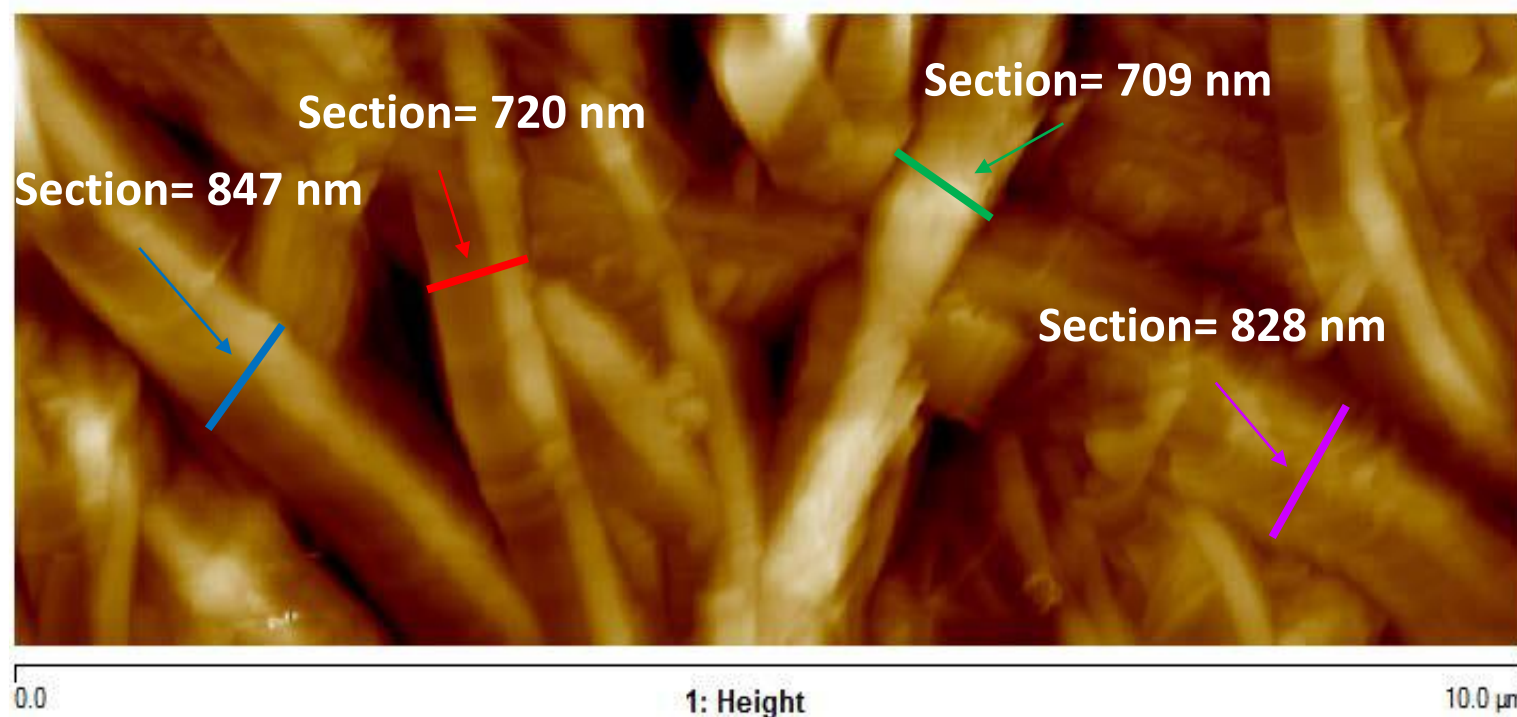
Biopolymer characterization

Tunic

Atomic Force Microscopy (AFM)



Large cellulose fibres



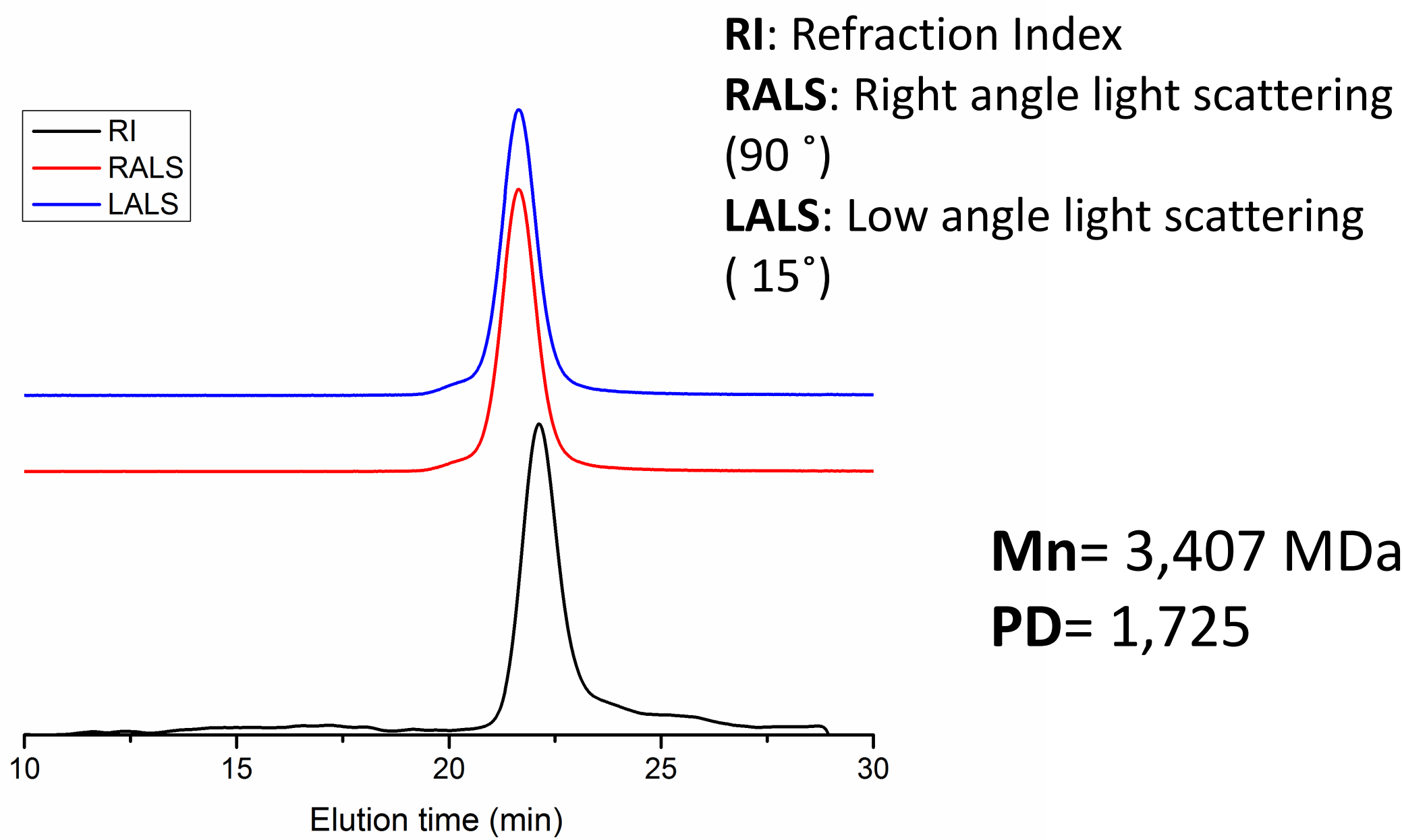
Small cellulose fibres

[2]

SPECIES	<i>Ciona intestinalis</i>	<i>Ascidia sp.</i>	<i>Halocynthia roretzi</i>	<i>Styela plicata</i>	<i>Styela clava</i>
SECTION (nm)	16,04	12,7	12,59	15,05	15

Body

Gel Permeation Chromatography (GPC)



Conclusion

Single microcellulose fibres from *Stela clava* tunic show a 15 nm diameter, in line with fibres found in other ascidians species. This makes this material suitable for nanocomposites. In addition, an intriguing non-sulfated high molecular weight polysaccharide is obtained from the body of *Styela clava*.

References

1. S.M. Kim , Purification of squirt cellulose memebrane from the cystic tunic of *Styela clava* and identification of its osteoconductive effect, Springer, 20:655-673 (2013)
2. Y. Zhao, Excellente chemical and material cellulose from tunicates: diversity in cellulose production yield and chemical and morphological structures from different tunicates species, Springer, 21:3427-3441 (2014)

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