

SEAWEEDS IN TEXTILES, PACKAGING AND PLASTICS

SeaRefinery, 27 June 2017, Cork

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OUTLINE

- Research
- Commercial applications
- Our interests
- Conclusions



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ALGINATE

Blend with thermoplastic starch and glycerin

- Decreases granular structure of starch => Plasticising effect
- Increase in elongation at break and impact resistance
- Decrease in elastic properties

ALGINATE

Microbeads - extrusion

- Alginate solution is extruded through syringe needle into a Ca^{2+} solution
- Size: $\sim 1000 \mu\text{m}$, depends of diameter of needle
- Especially for drug delivery

ALGINATE

Microbeads - emulsion

- Emulsifying alginate solution in oil containing CaCO_3
- Size: $\sim 2\text{-}25\ \mu\text{m}$, depends of agitation speed and emulsifier
- Especially for drug delivery

AGAR

Basis for plastics

- Agar plasticity project (<http://www.kosuke-araki.com/agar-plasticity-2015>)
- 3 material experiments
 1. pure agar powder
 2. combining agar powder with extracted red algae fibre
 3. mixing agar powder with shell ash

PIGMENTS

SeaColors project

(<http://www.seacolors.eu/index.php/en/>)

- Focus on dyes out of micro and macro algae for textiles

	STRAIN	TARGET PIGMENT/DYE
Macroalgae	Porphyra	PE, PC
	Ulva	Carotenoids (GREEN)
	Gracilaria	PE, PC
Microalgae	Synechococcus sp.	PE (RED)
	Nostoc sp.	PC (BLUE)
	Arthrospira platensis	PC (BLUE)



PIGMENTS

Blauwe keten

- Focus on cultivation of micro algae (*Spirulina*) which contains fycocyanin dye and application
- Applications: textile, paint, paper,...

SEAWEED FOOD PACKAGING

PlantPack

- Blended seaweed extracts with starch (derivatives) to be applied for paper packaging
- Paper and paperboard with enhanced barrier properties
- Water and grease resistant coatings



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ALGINATE PATCHES

Wound dressing

- Haemostatic properties (highly absorbent)
- Can be modified with Ag
- Many products: Algisite M, Melgisorb, Nu-Derm Alginate,...

ALGINATE

Viscosity modifier

- Dye pastes in textile and printing industry
- Color yield much higher compared to traditional thickeners
- Also applicable for coatings
- Other seaweed polysaccharides can be used e.g. carrageenan



SEACELL

- Cellulose fiber serves as a host for the seaweed
- Lyocell process (Eucalyptus fiber)
- Applications: mainly clothing and home textiles

ALGIX

ALGENT, a division of ALGIX, has a mobile algae harvesting platform using dissolved air flotation to separate algae biomass from water.



ALGIX

Solaplast resin grades

- Algae loading: 45-55%
- PP, PE, PLA, EVA, PS and polybutylene adipate terephthalate
- Injection molding, sheet extrusion, blown film and thermoforming



ALGOPACK

- Capable of producing a rigid material made from 100% based industrial waste from brown seaweeds
- Seaweed types cultivated by Algotpack[®] come from sources such as aquaculture farms

ALGOBLEND

- Additive in standard polymer
- Brown granules (can be mass dyed)
- Extrusion, thermoforming and injection molding



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OUR INTERESTS

UV protection

- Phlorotannins and mycosporine-like amino acids are UV absorbers
- Algae closer to water surface have more UV absorbers
- Applying phlorotannins in coating to protect textile from UV



OUR INTERESTS

Antimicrobial properties

- Biocides for textile: mainly quaternary ammonia compounds and silver
- Tendancy for green products
- Fucoidan, laminarin,... are reported as antibacterial products



OUR INTERESTS

Seaweed fibres

- 100% seaweed derived textile
- Melt extrusion not possible
- Different processes are being evaluated



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CONCLUSIONS

- Research in many areas
- Not many commercial products for packaging and plastics

ACKNOWLEDGEMENT

Thanks to

funding agencies of Denmark, Flanders, Iceland, Ireland and Norway
& ERA-MBT Joint Call Secretariat
for financing and supporting the project

