

# New cellulose chemicals for surfactant (and thermoplastic) applications

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Industry meet CERES

Marketplace Pitch



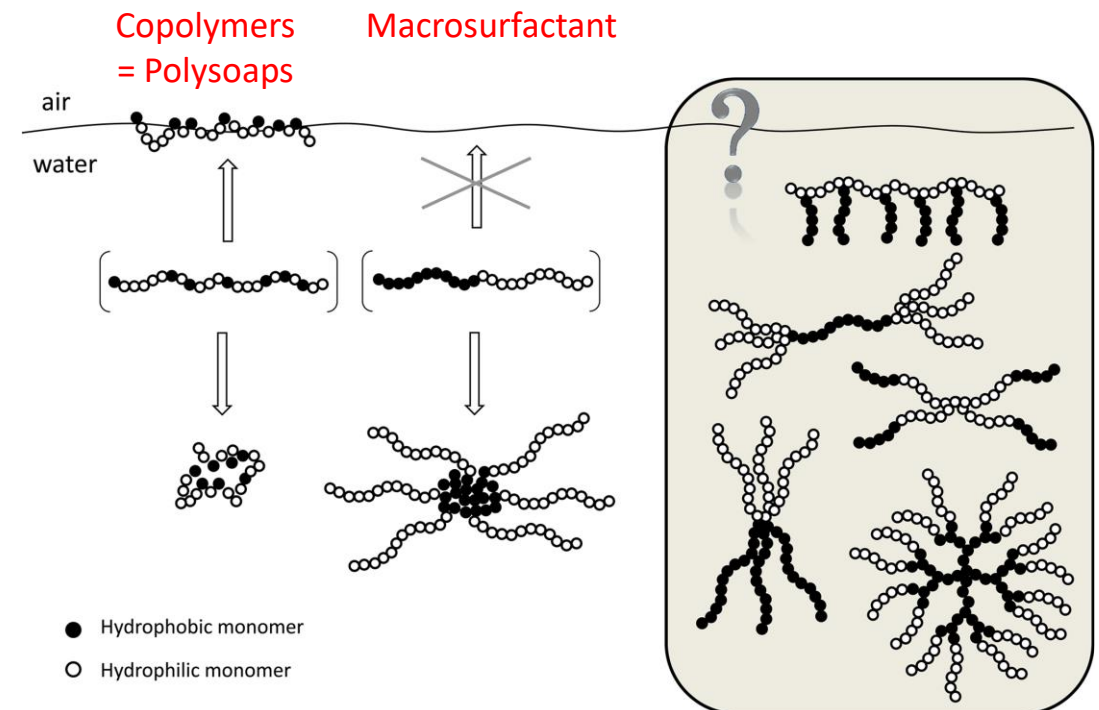
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# Block Copolymers in surfactant applications

## Polymeric surfactants

- Characteristic molecular self-assembly behavior in solutions, at interfaces and in bulk, generating nanoscale structures of different shapes
- Typical applications are:
  - Emulsion stabilization
  - Viscosity modifiers
  - Enhanced oil recovery
  - Coatings and films
- Typical examples
  - Polyvinyl alcohol
  - Cellulose ethers
  - Acrylic latex

The structure has an influence on the behavior displayed in solution and at the air/water interface:



Raffa et al., Chem. Rev.  
2015, 115, 8504–8563.

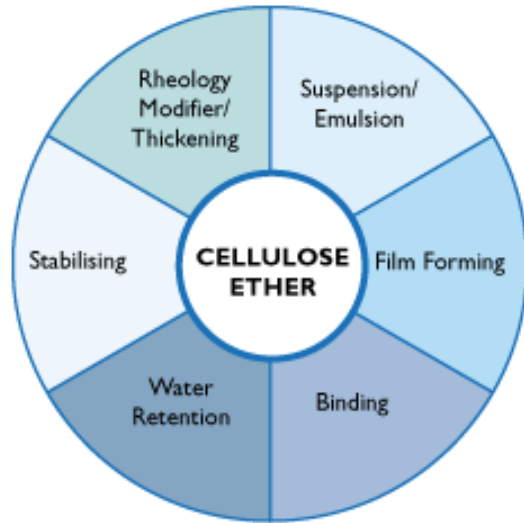


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# Some properties of cellulose and hemicellulose derivatives

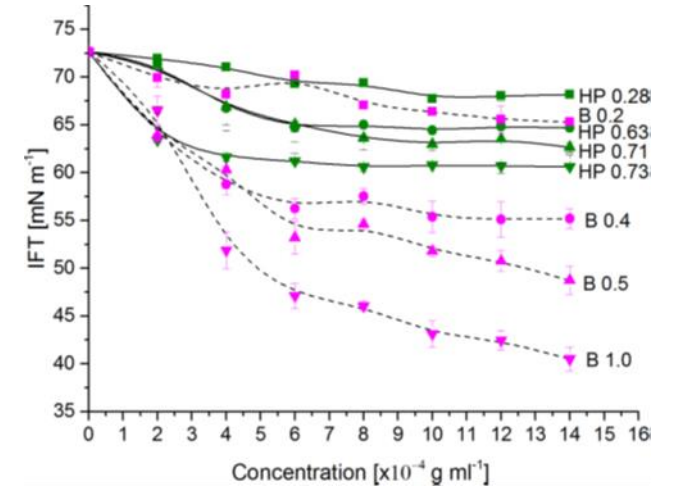
Etherified cellulose MHPC, EC, MeC, HPC:

Applications in cosmetics, food and chemical industry:



<http://celluloseether.com/what-is-cellulose-ether/>

Esterified hemicelluloses decrease the surface tension in aqueous solution, the effect depends on the substituent



Foam and emulsions can be formed from the etherified grades with aliphatic group (alkoxyhydroxy-propylated)



Nypelö, T., Laine, C., Aoki, M., Tammelin, T., Henniges, U., Etherification of wood-based hemicelluloses for interfacial activity, Biomacromolecules 2016, 17, 1894–1901, DOI: 10.1021/acs.biomac.6b00355.



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# Topics for research in FinnCERES

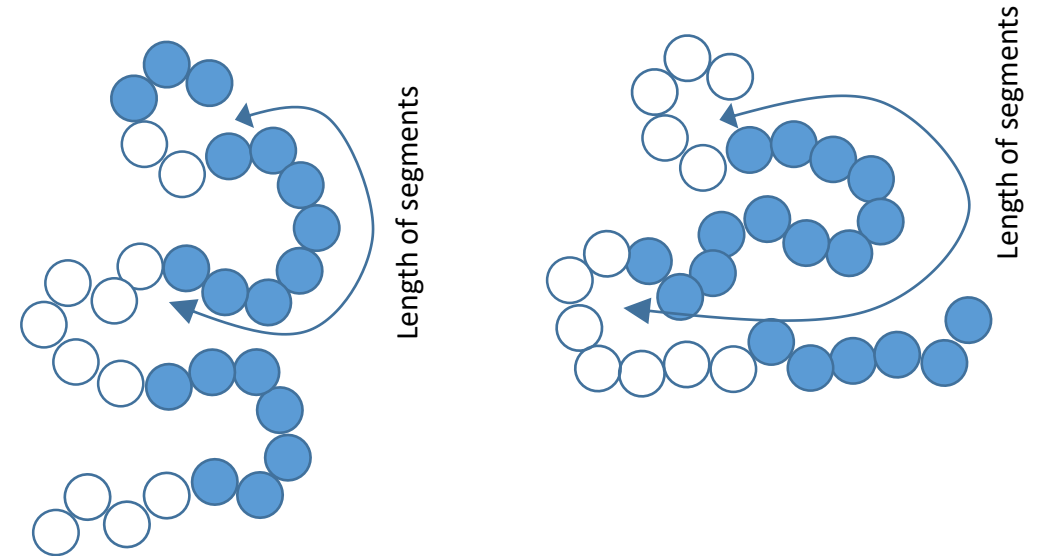
Study of the self-assembly behaviour of cellulose and hemicellulose derivatives from current methods

- Foaming and emulsion properties have been demonstrated and utilized
- Correlation to the structure of the polysaccharides need to be studied
  - Distribution of the substituents dependent on reaction conditions and substituents?
  - Self-assembly behaviour

## Hypotheses:

- Tailoring of properties will open new application fields
- The degree of substitution can be decreased.
- The full scale in molecular weight can be utilized by cellulose and hemicelluloses

Development of methods to steer the homogeneity/heterogeneity of the substitution



- Some approaches have been reported

