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Investigation of alkyl polyglucoside / fatty alcohol mixed surfactant ability to form lyotropic liquid crystals in formulated systems

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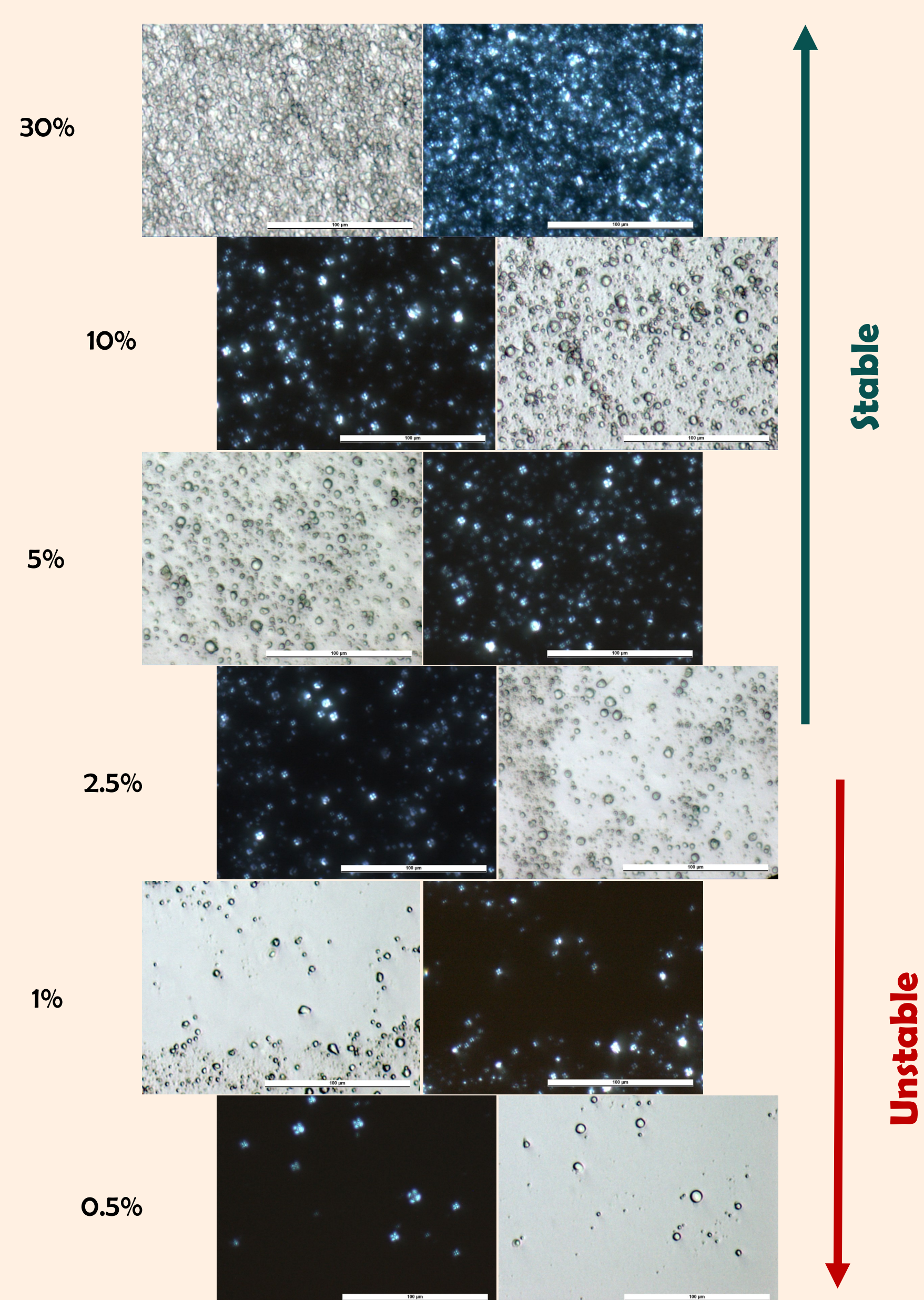
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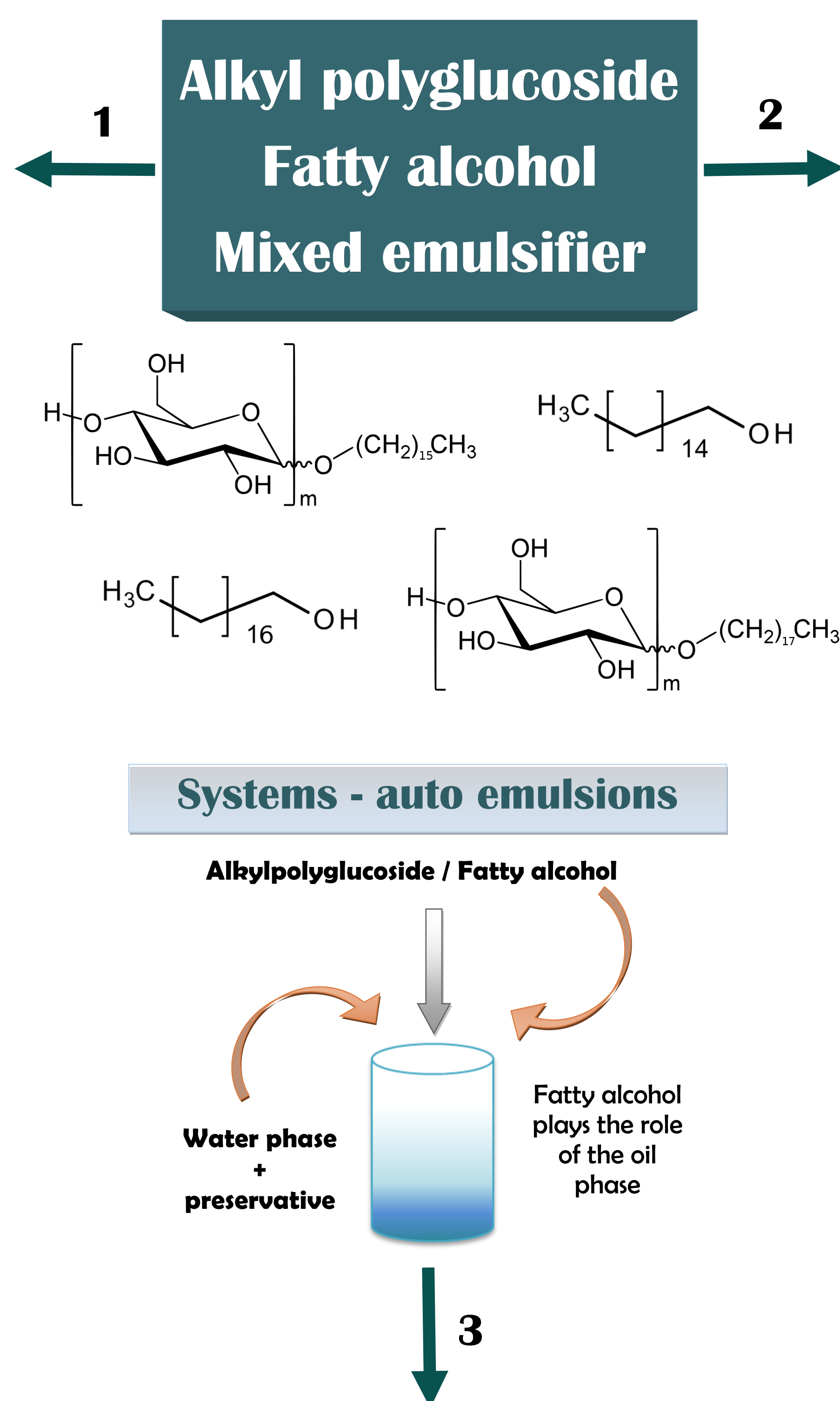
Characterization of the behavior of the mixed emulsifier C₁₆-C₁₈ APG/C₁₆-C₁₈OH and its ability to form lyotropic liquid crystals depending on :

The concentration of the mixed surfactant in solution

To investigate the APG/FA emulsifying capacities



Stability does not depend on the presence of the liquid crystals, but on its quantity

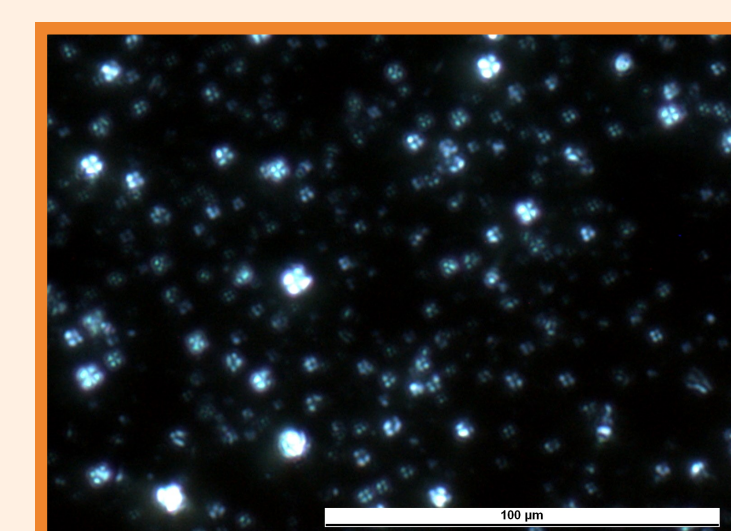


The ratio of the alkyl chains C₁₆/C₁₈ for APG and FA

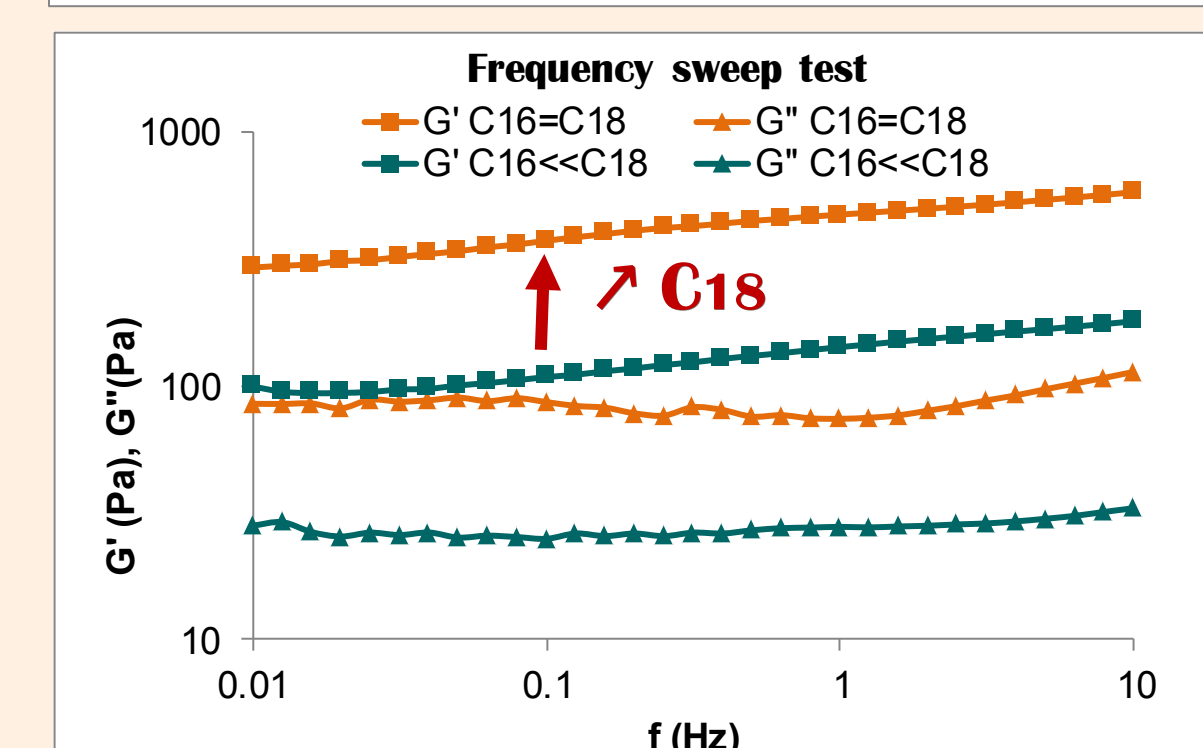
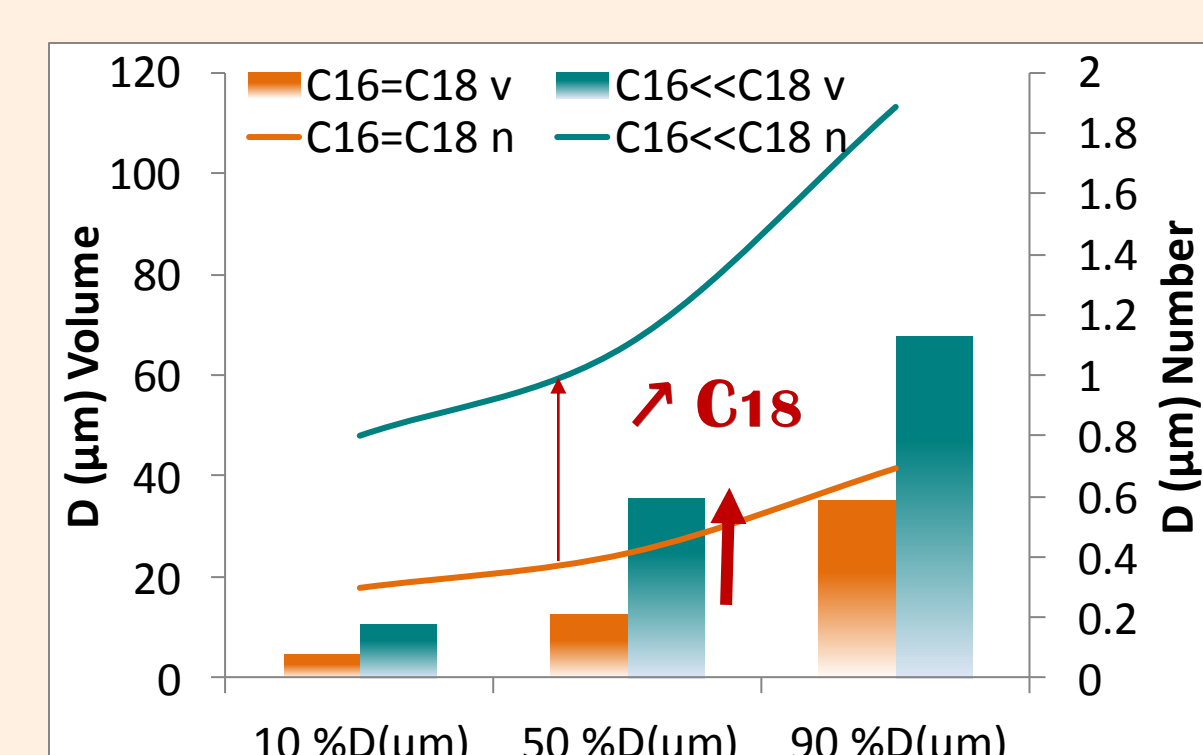
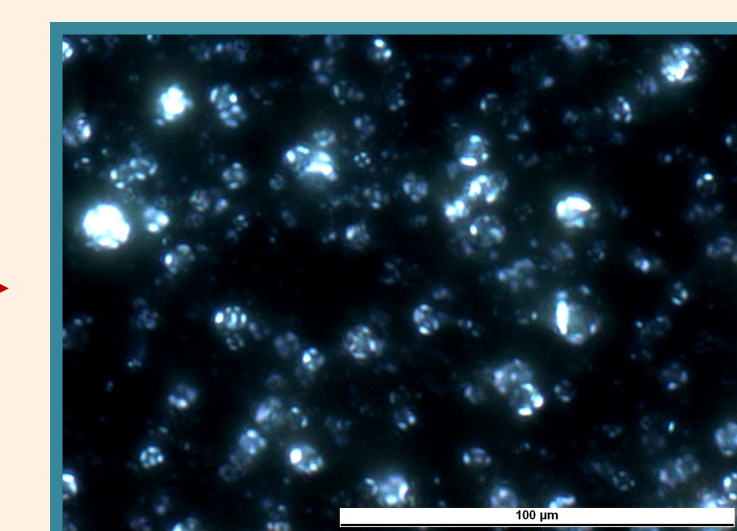
To describe the importance of the alkyl chain length in the molecular organization

Two systems analyzed:

C₁₆=C₁₈ APG/FA

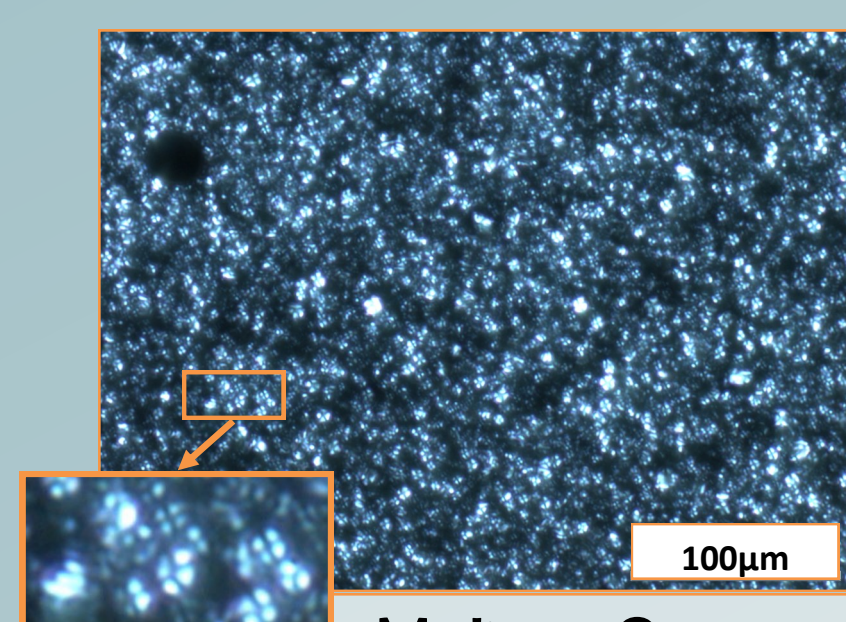


C₁₆<<C₁₈ APG/FA

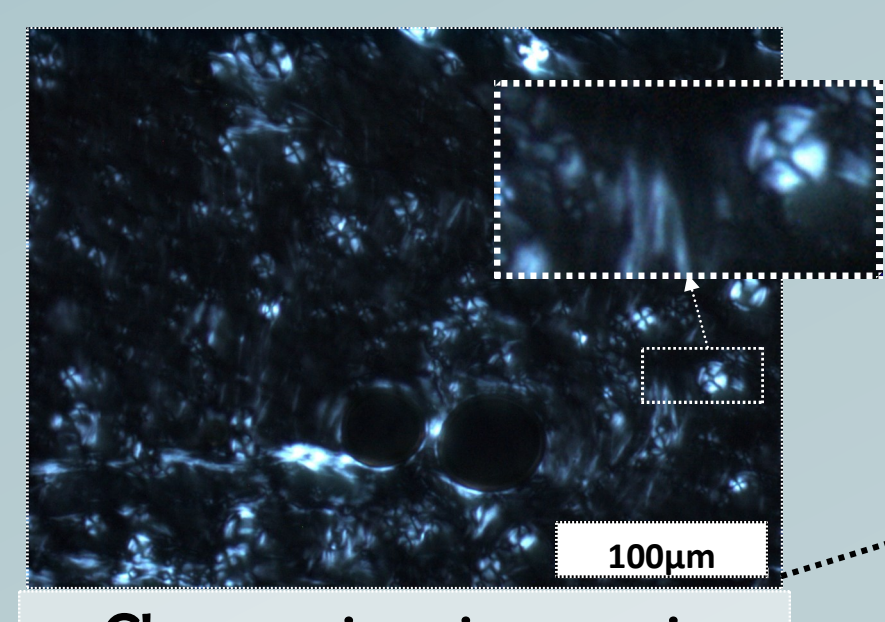


The quantity, the size and the behavior of the lamellar phases are changed once C18 quantity in the C₁₆/C₁₈ ratio rises

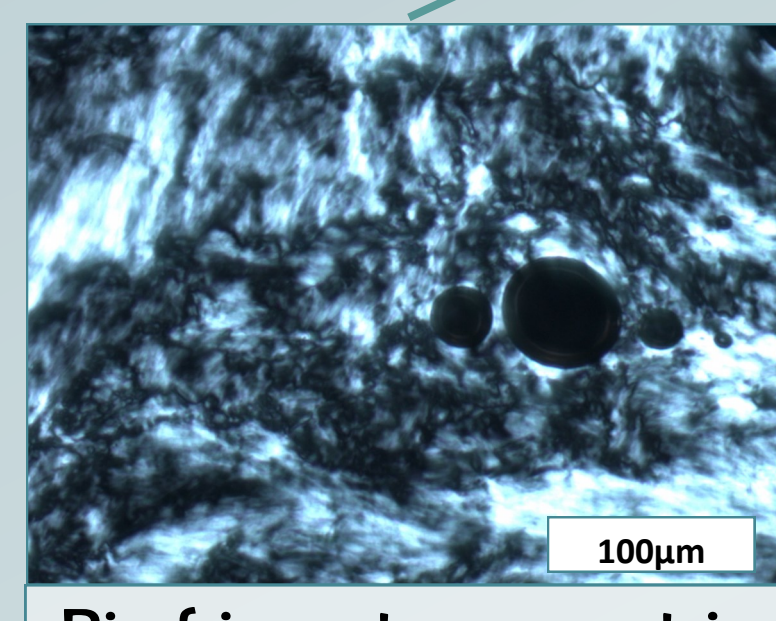
APG<FA



APG=FA



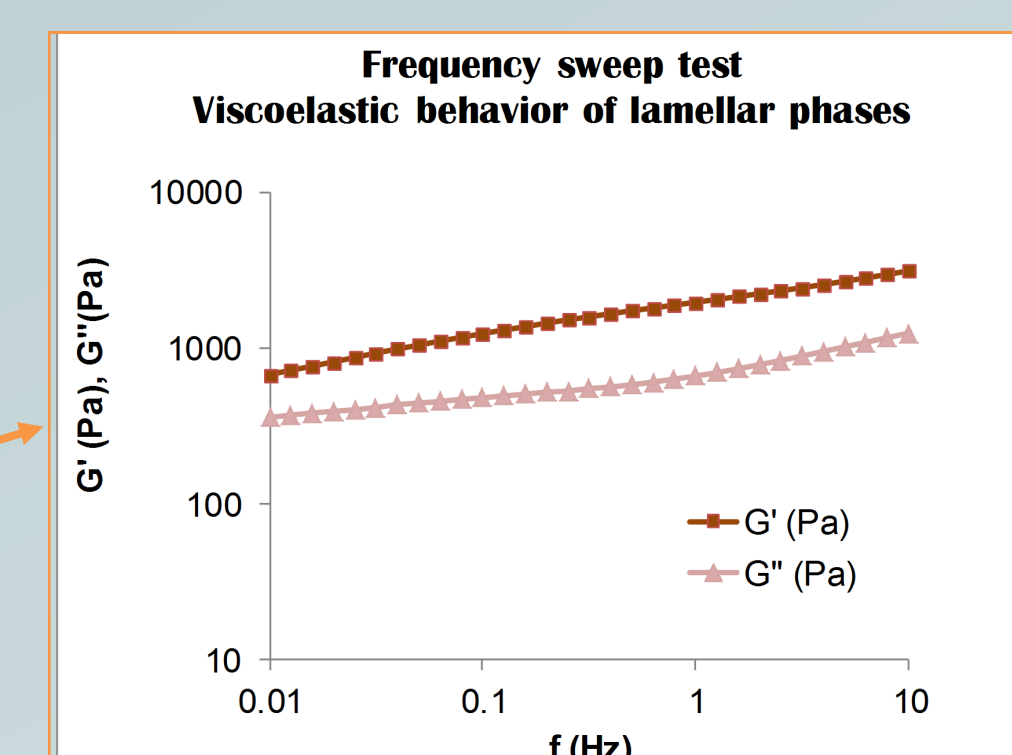
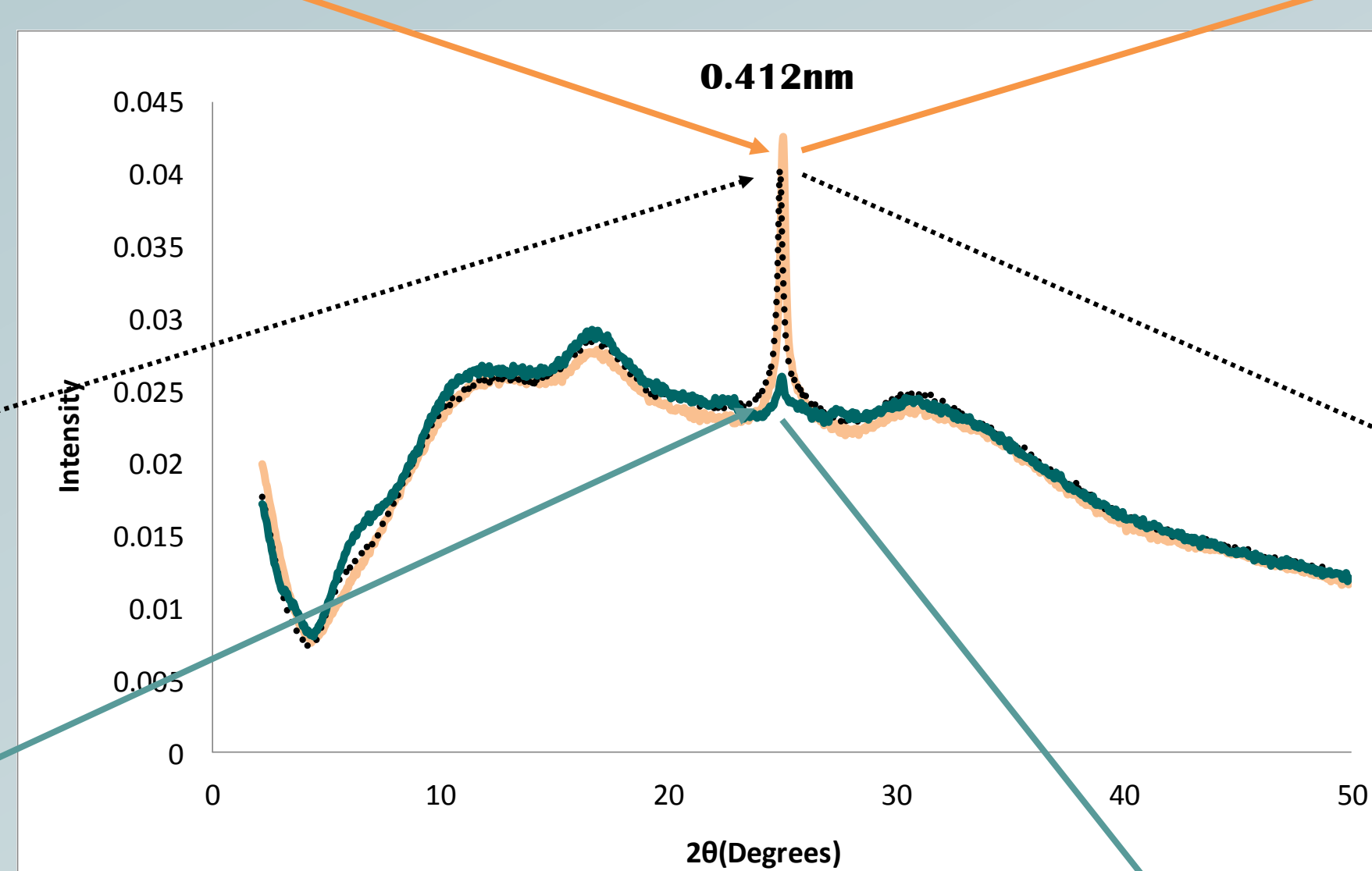
APG>FA



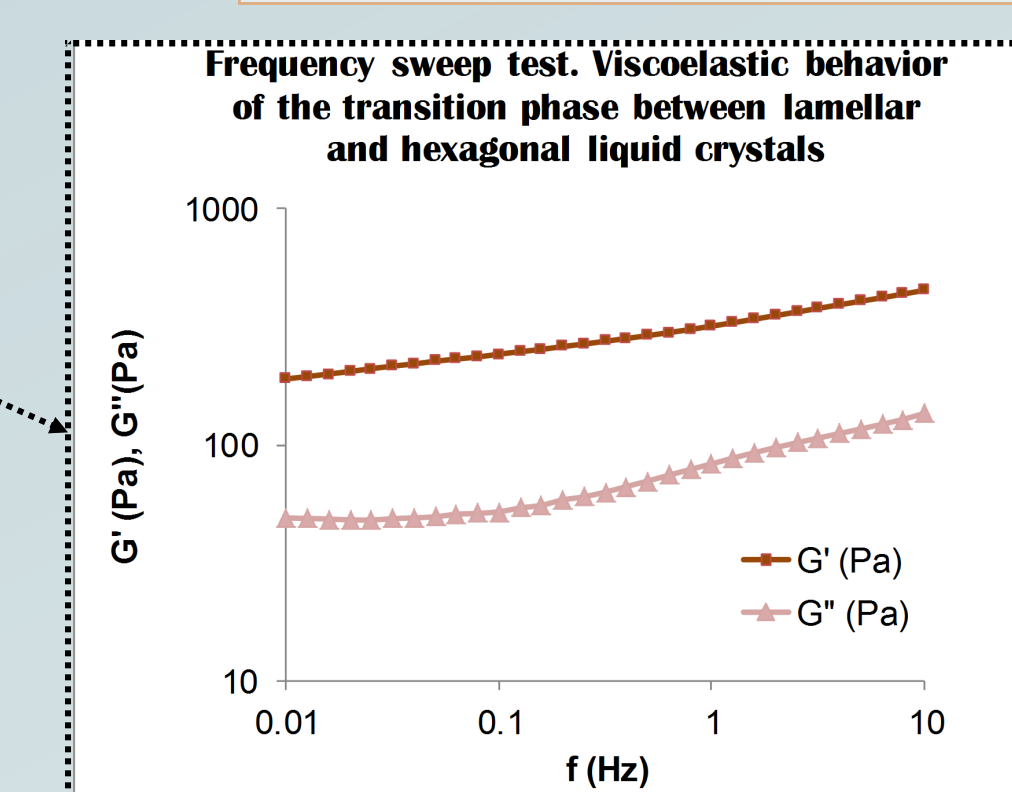
The C₁₆-C₁₈ APG/C₁₆-C₁₈OH ratio

The C₁₆-C₁₈ APG/C₁₆-C₁₈OH ratio, in order to evidence the properties provided by each raw material

Intensive peak at 0.412nm - L_β formation³

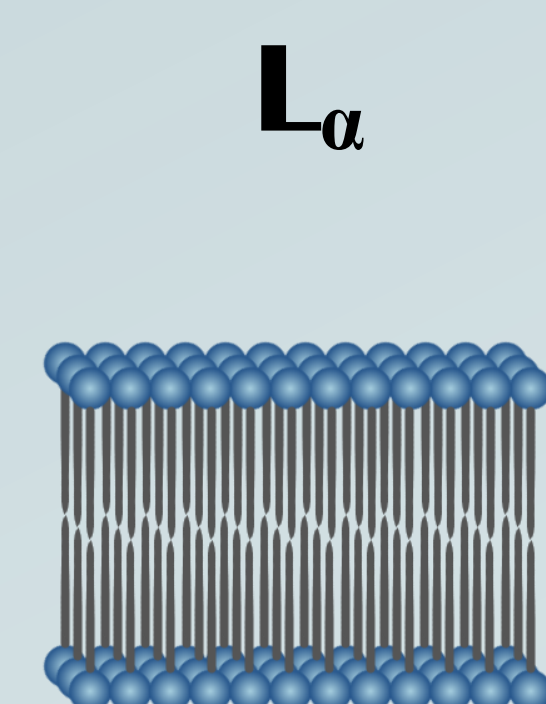
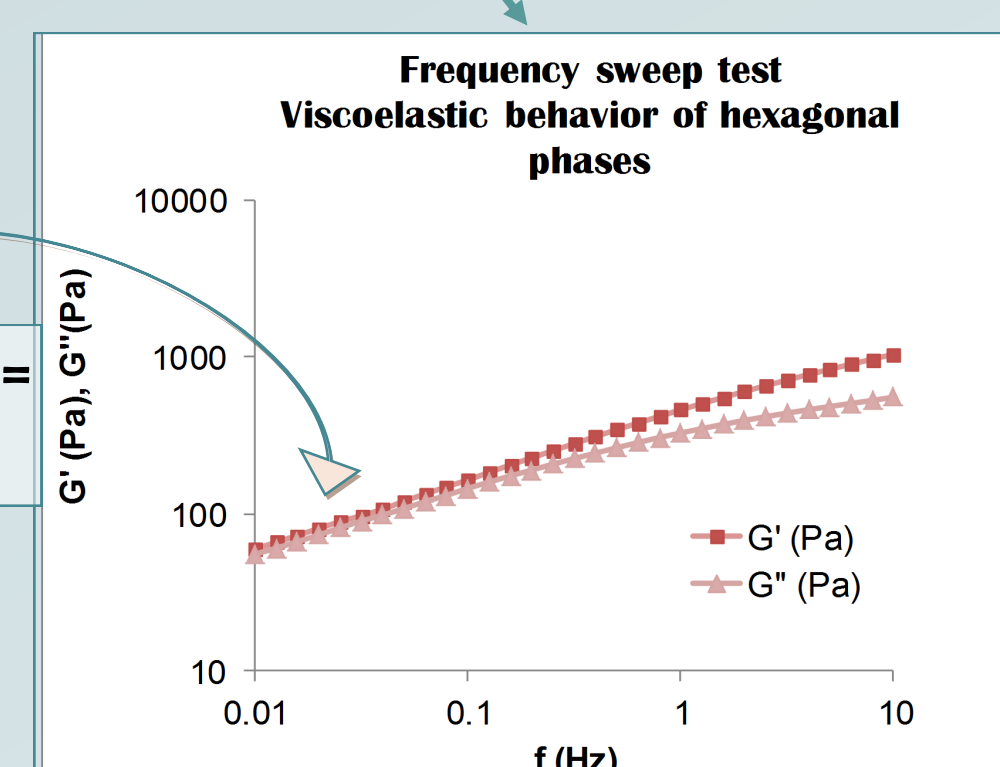


G' parallel to G'' - behavior of lamellar phases^{4,5}



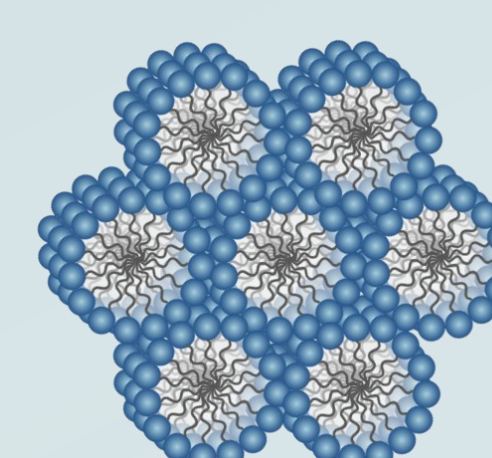
G' parallel to G'', still the behavior of lamellar phases, but the system is less elastic (G' < G'') and viscoelastic (tan δ > 1) than lamellar L_β phase

Cross point of two moduli G' & G'' = hexagonal phases behavior⁶



L_β + H₁

H₁



Conclusion

Conditions of lyotropic liquid crystals formation for the APG/FA mixed emulsifier:

- The quantity of liquid crystals is directly linked to emulsifiers concentration in auto-emulsion;
- The APG/FA ratio variation gives access to different types of liquid crystals;
- The alkyl chain length for the mixed emulsifier has a significant impact on the auto-emulsions microscopic and macroscopic properties.

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