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## **Influence of the emollient polarity on the properties of cosmetic emulsion containing lamellar liquid crystals**

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Michel Grisel

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# Influence of the emollient structure on the properties of cosmetic emulsions containing lamellar liquid crystals

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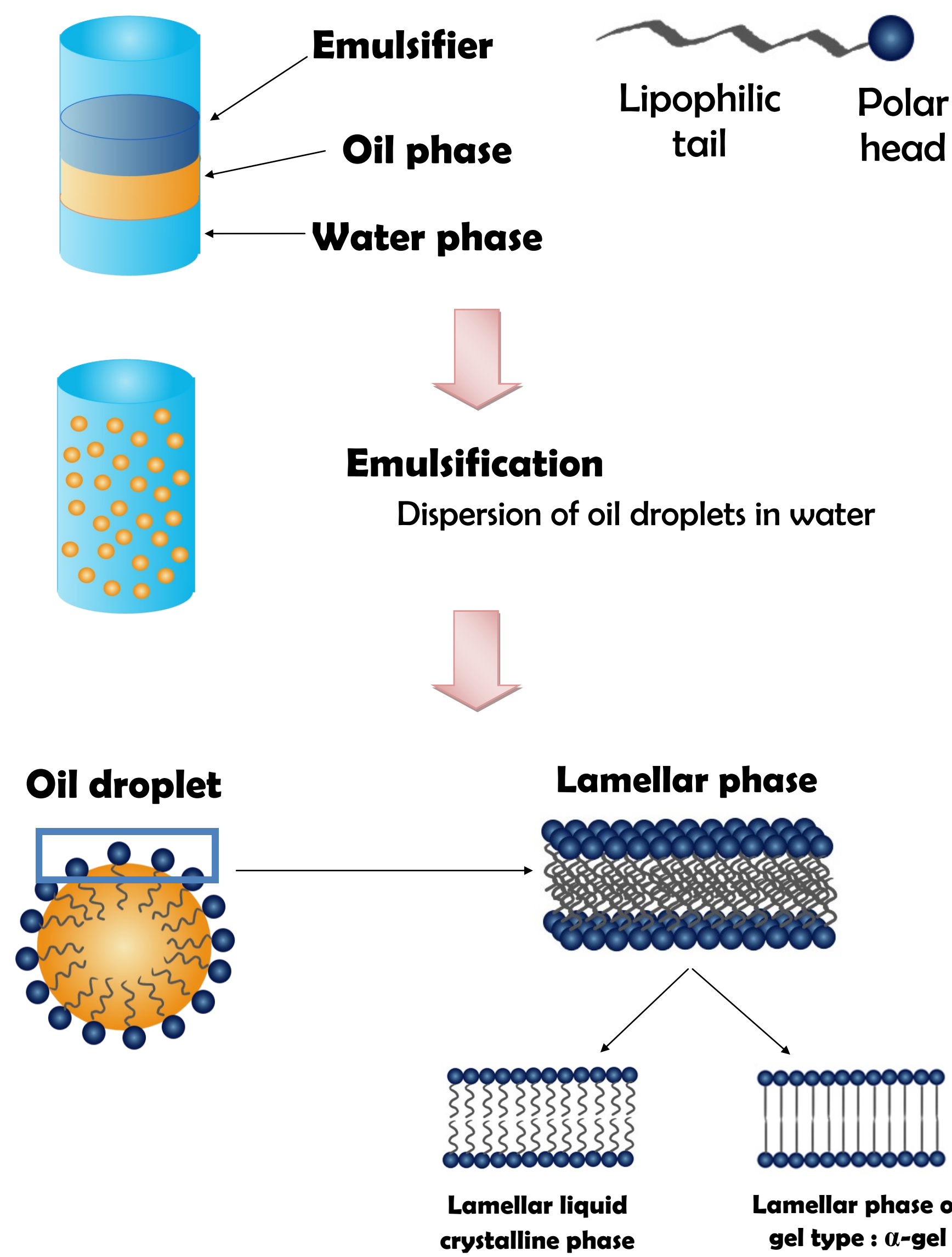
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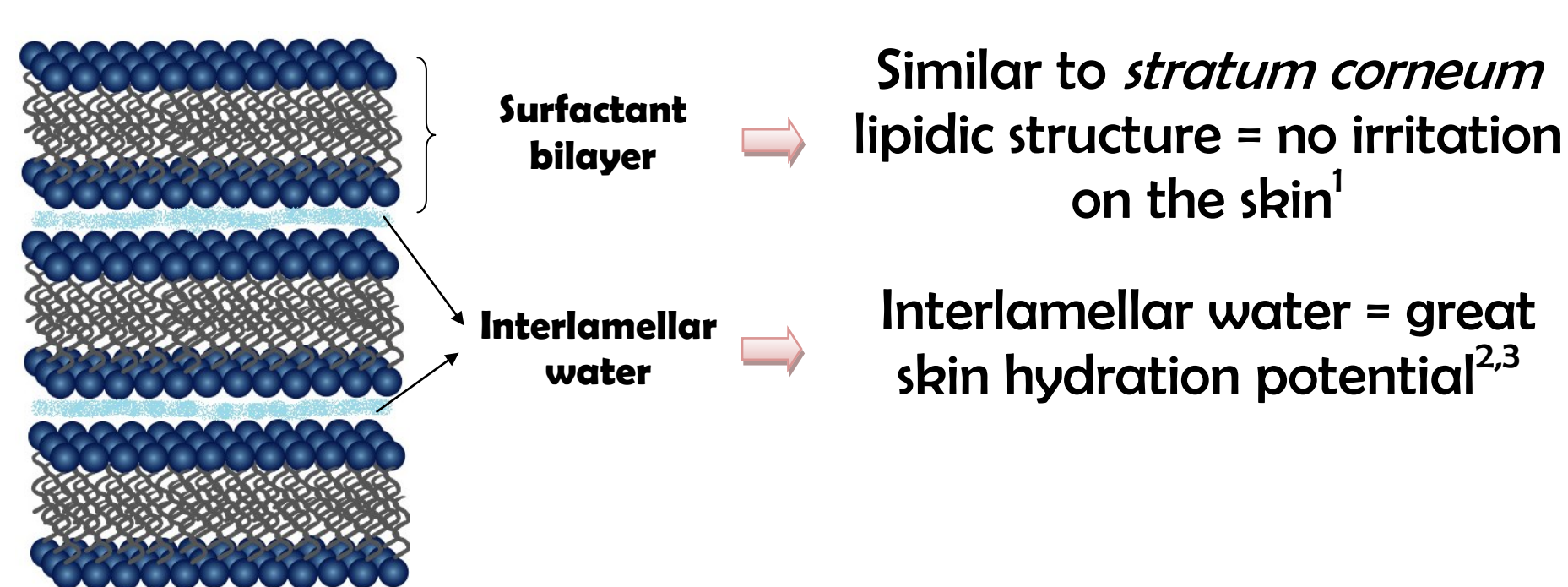
## Aim

The aim of this study is to understand the influence of the emollient structure on the properties of cosmetic emulsions containing lamellar liquid crystals.

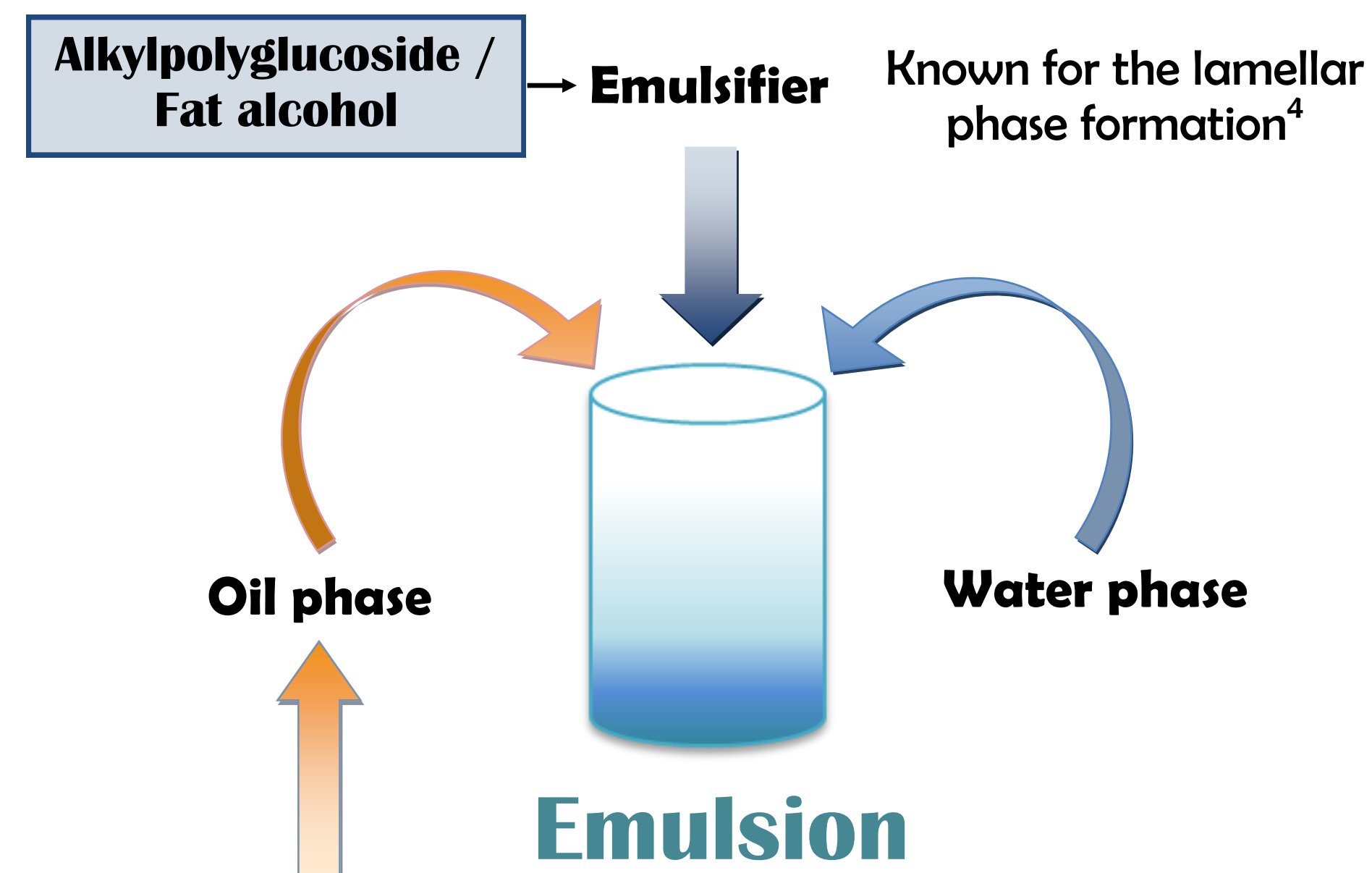
## Emulsion



## Why lamellar phases?



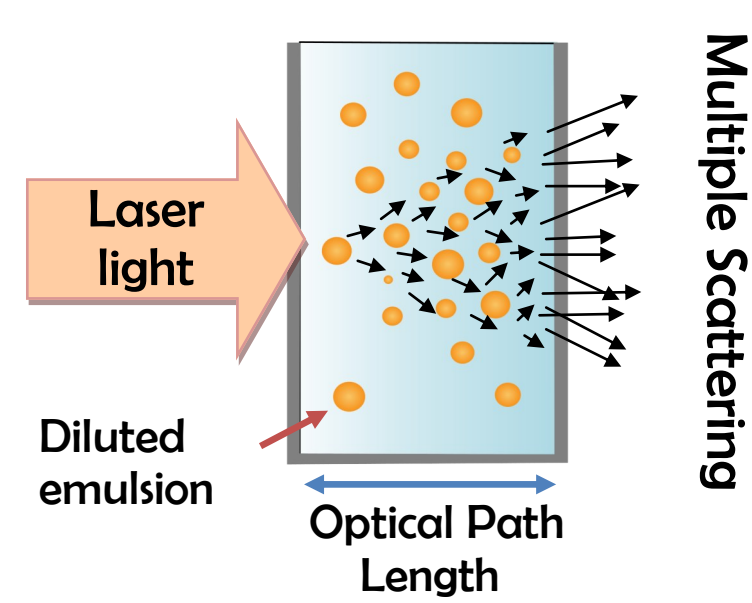
## Formulation



Name	Abr.	Chemical structure	Interfacial tension vs water (mN/m)	
Mineral oil	MO	Hydrocarbons mixture	54	Nonpolar
Isohexadecane	IHD	C <sub>16</sub> H <sub>34</sub>	43,61	
Ethylhexyl palmitate	EHP	C <sub>24</sub> H <sub>48</sub> O <sub>2</sub>	30,11	
Ethylhexyl stearate	EHS	C <sub>26</sub> H <sub>52</sub> O <sub>2</sub>	29,78	
Propylene glycol dicaprylate/ dicaprate	PGDD	C <sub>39</sub> H <sub>76</sub> O <sub>8</sub>	22,02	Polar
Caprylic/Capric Triglyceride	CCT	C <sub>21</sub> H <sub>40</sub> O <sub>5</sub>	13,49	
Cocoglycerides	COCO	Blend of Mono-, Di- and Triglycérides	8,37	

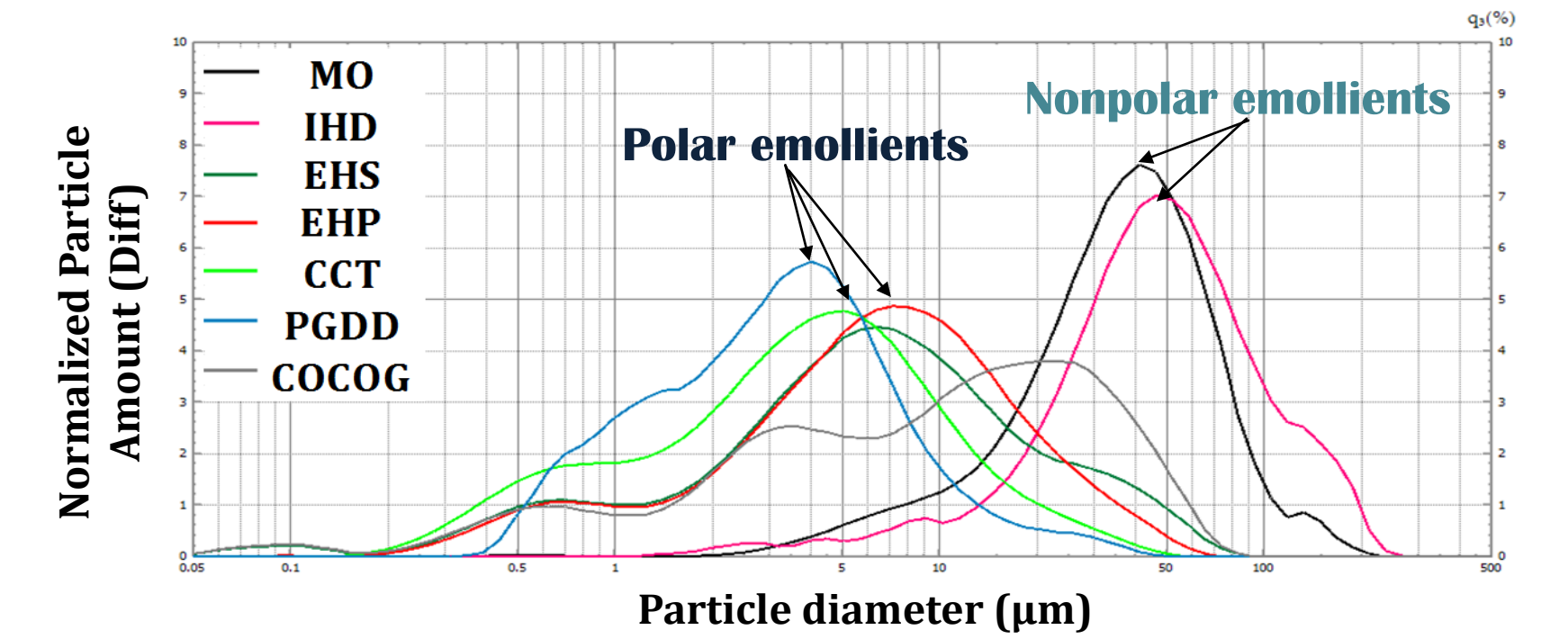
## Methods

### Granulometry



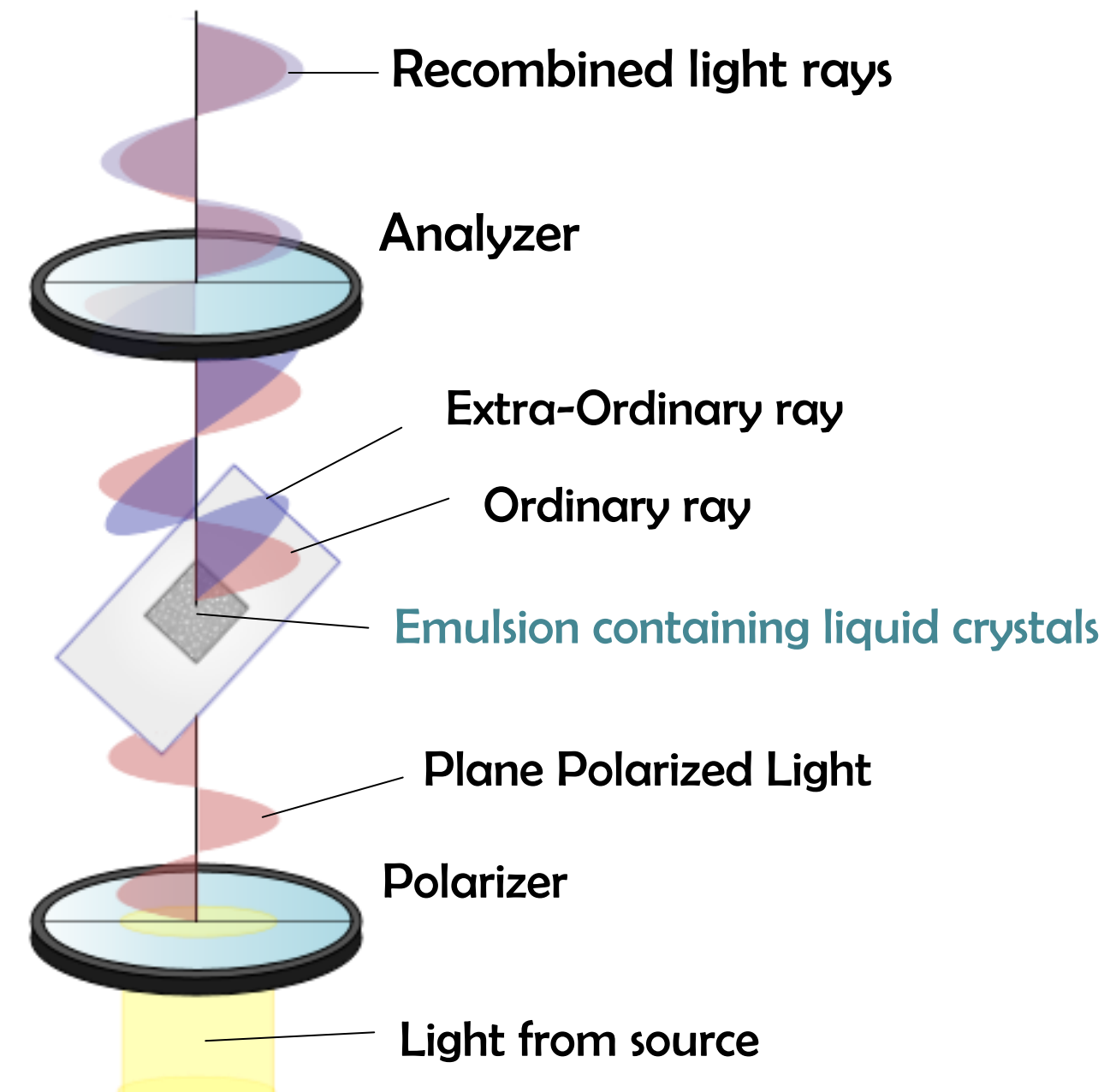
## Results

### Emulsions containing nonpolar oils & droplet size

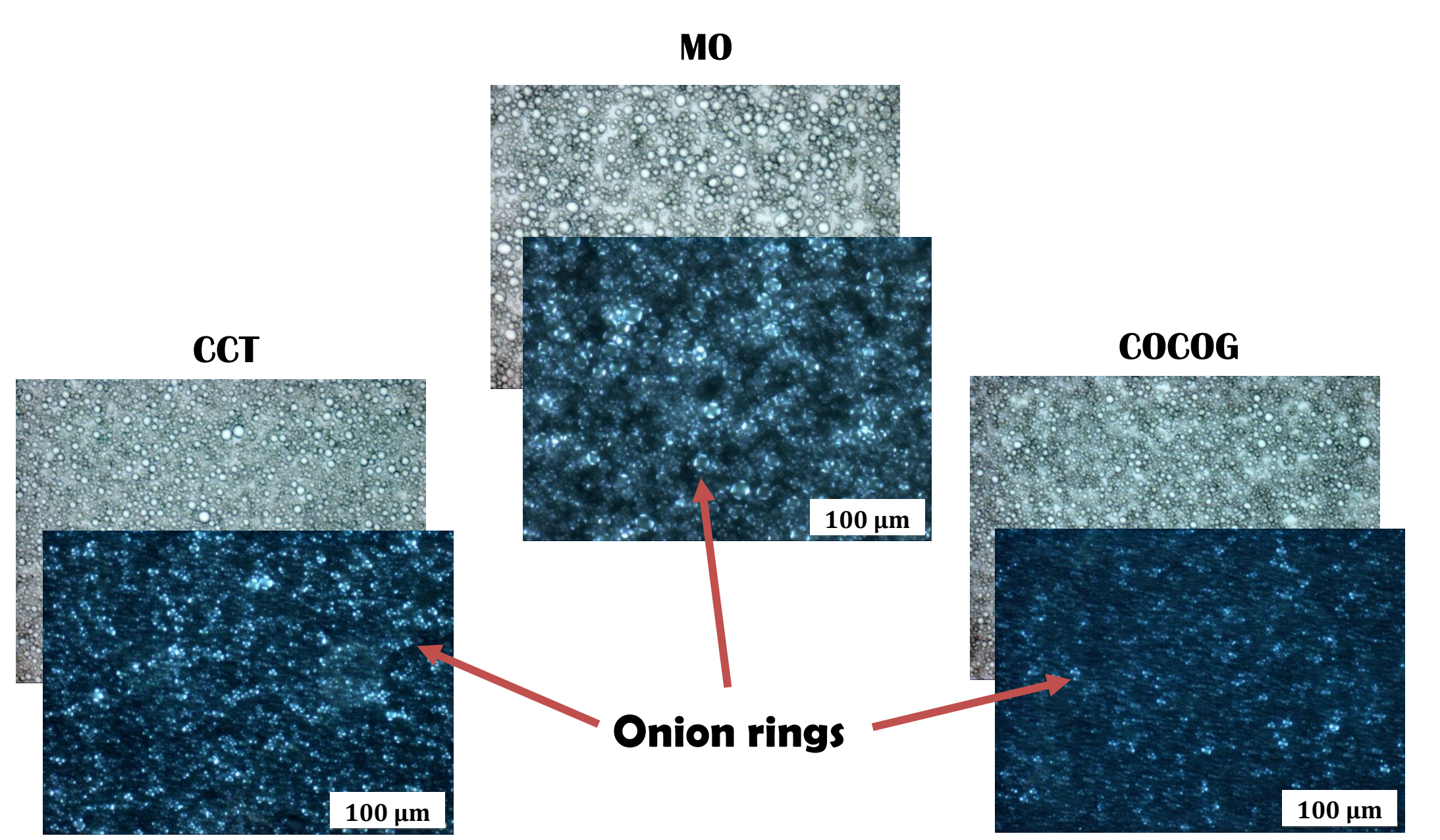


Results coherent with microscopic observations

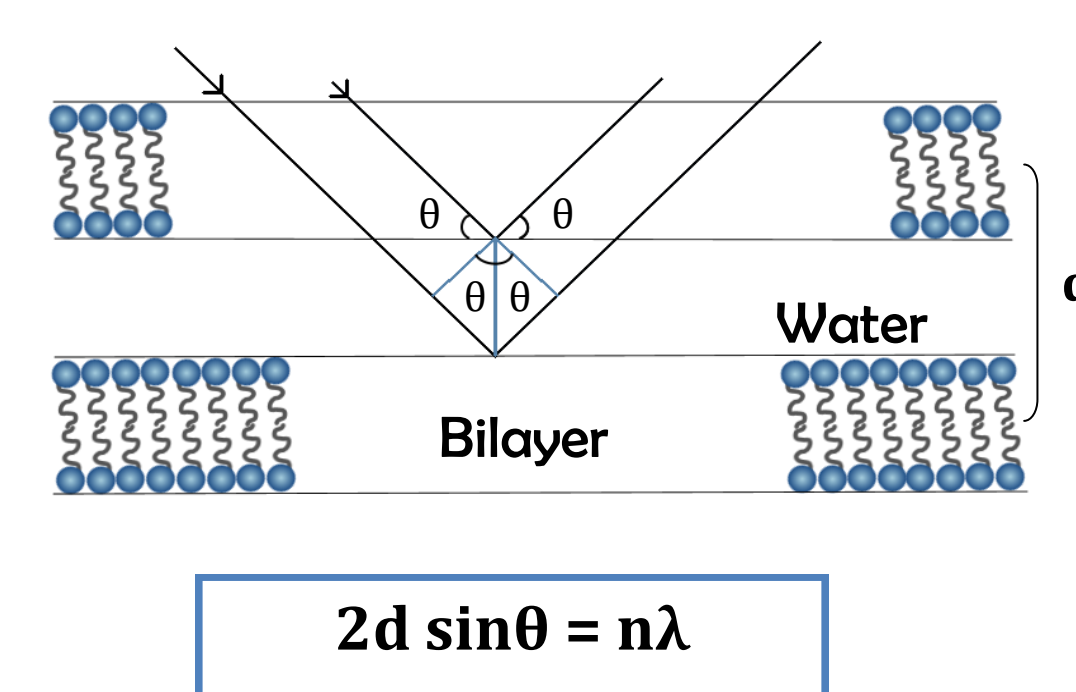
### Polarized light Microscope



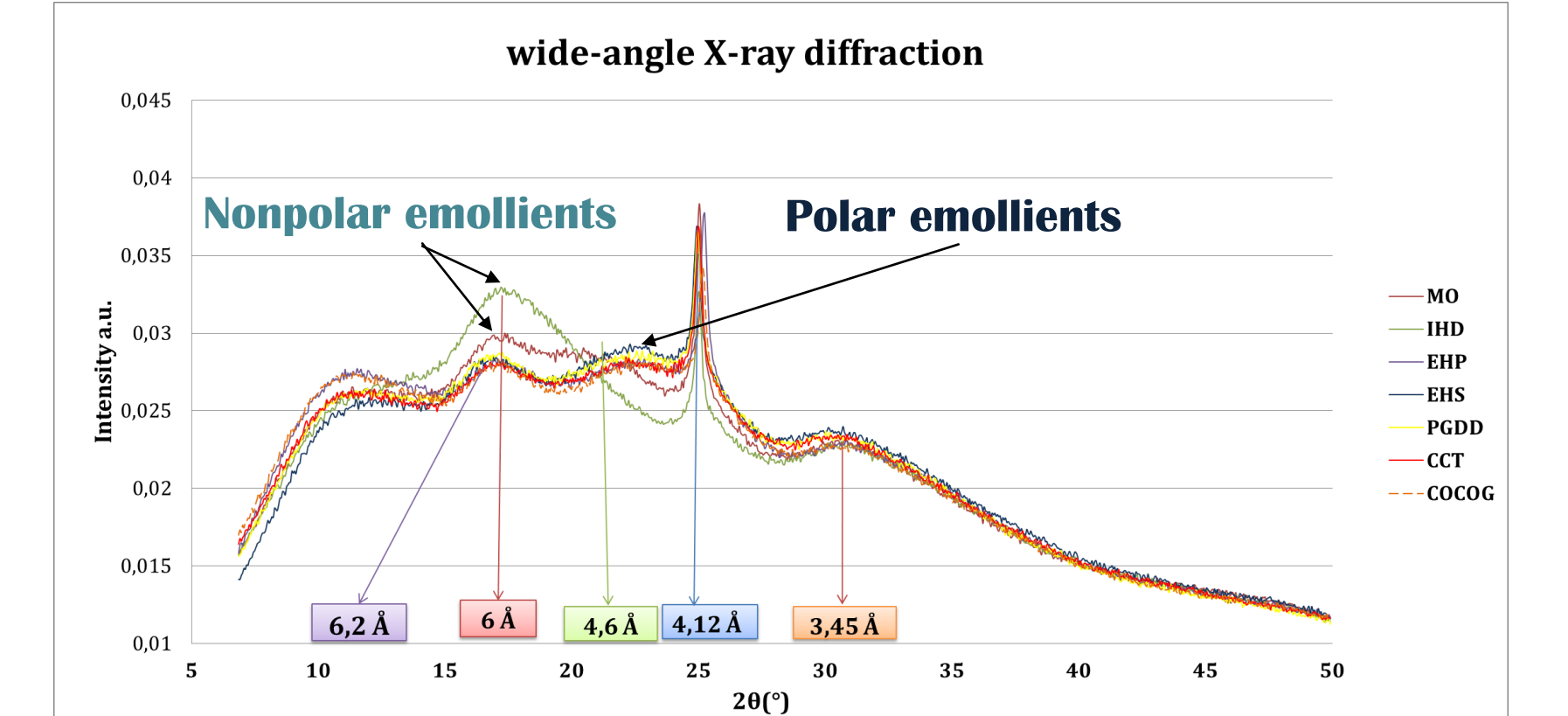
### Lamellar phases formation proved by the presence of « Onion rings »



### Wide-angle X-ray diffraction



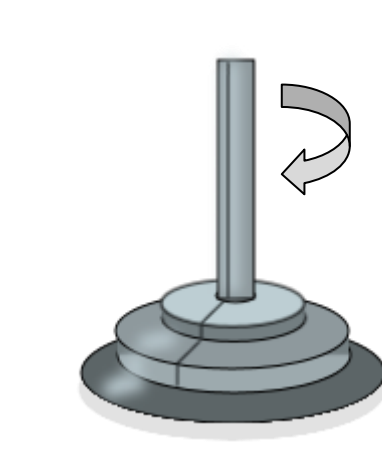
### alpha-gel present in all emulsions at 4,12 Å<sup>5</sup>



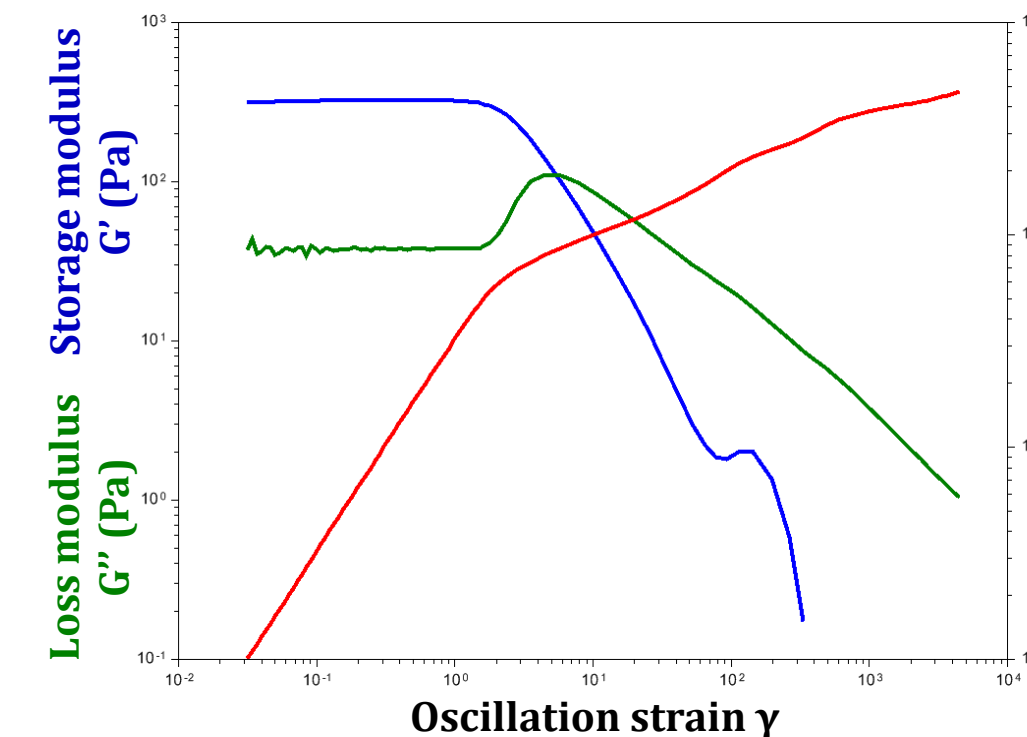
Distances for lamellar liquid phase ≠ function of oil polarity

### Rheology

#### Oscillatory test Amplitude sweep

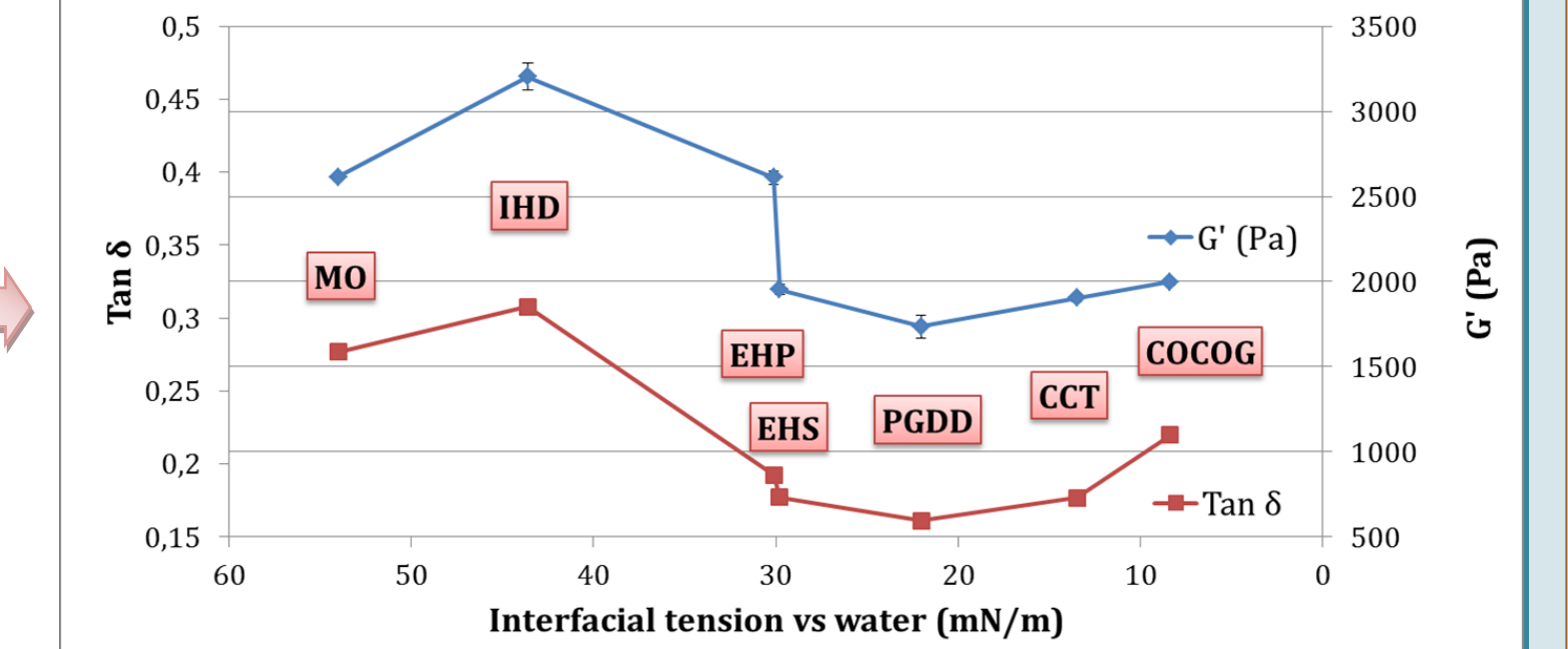


$$\tan \delta = G''/G'$$



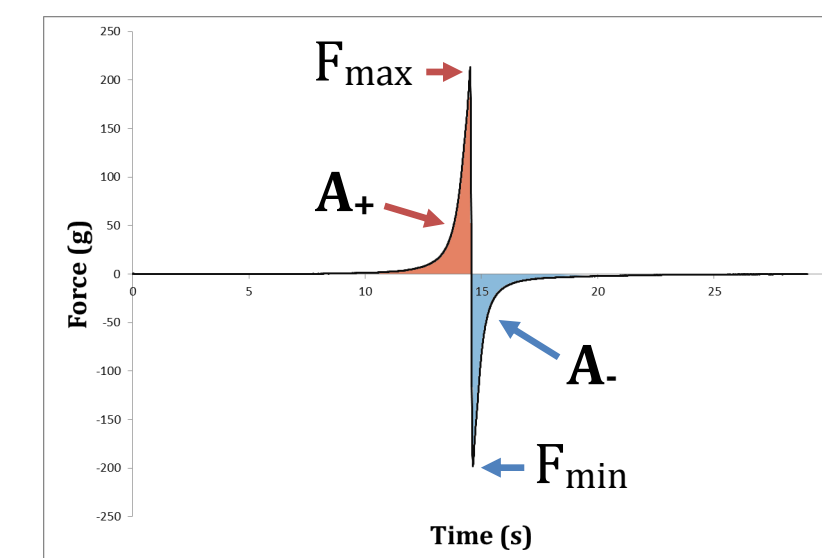
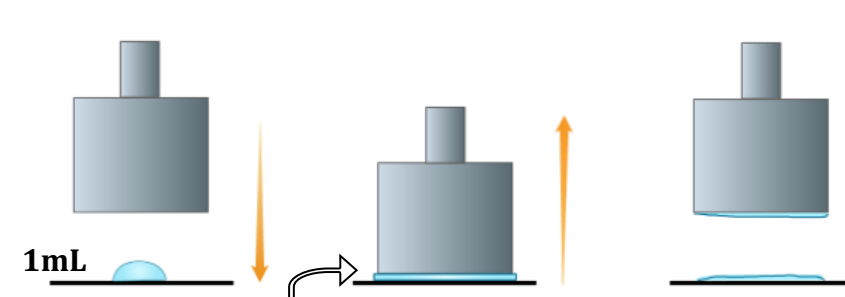
### Tan delta & for the emulsions containing nonpolar oils

#### Oscillatory test: Amplitude sweep.



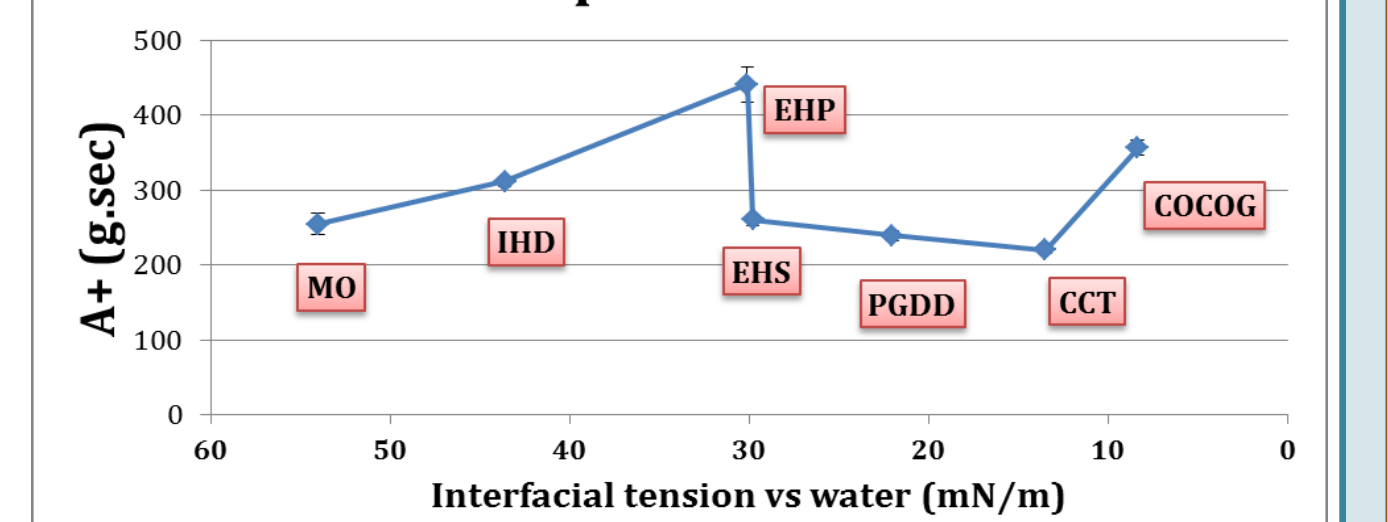
### Texture analysis

#### Compression test



### No direct link between emollient polarity and texture properties

#### Compression test



## Conclusion

Emollient structure has an impact on the properties of cosmetic emulsions like:

- Droplet size ( $\lambda$  for polar oils)
- Microstructure (visually emulsions are finer for polar oils)
- Lamellar phase formation (oil polarity impacts the structure of lamellar liquid phase)
- Viscoelastic behavior ( $\tan \delta$  polar oils <  $\tan \delta$  nonpolar oils)

## Perspectives

- Sensory analysis of the emulsions. Are the differences between polar and nonpolar oils perceptible?
- Determination of the emollient impact on lamellar phases hydration capacity.