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STABILITY TO OXIDATION AND INTERFACIAL BEHAVIOR AT AIR-WATER INTERFACE OF MINIMALLY-PROCESSED VERSUS PROCESSED WALNUT OIL-BODIES



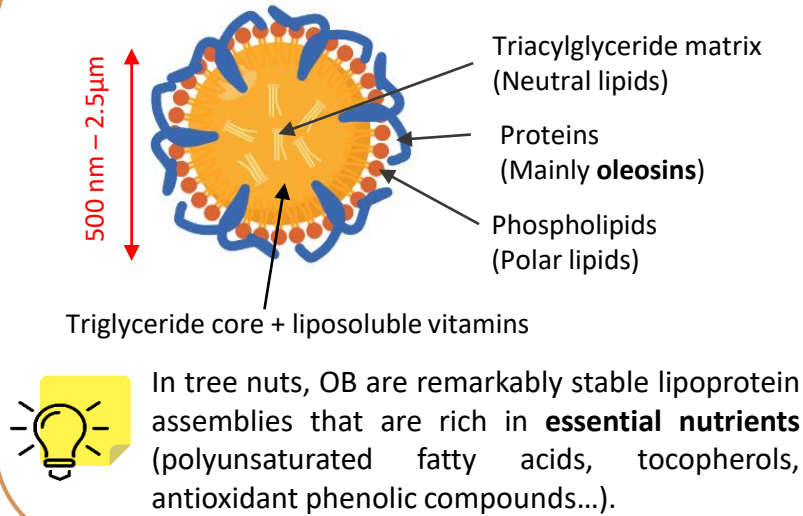
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The consumption of walnuts is associated with many health benefits, attributed to their fatty acid profiles, which is rich in polyunsaturated fatty acids (PUFA). As a result, walnuts are used in several food products, such as walnut-based beverages, where fat is partly dispersed under the form of natural lipoproteic assemblies, which are called oil bodies (OB).

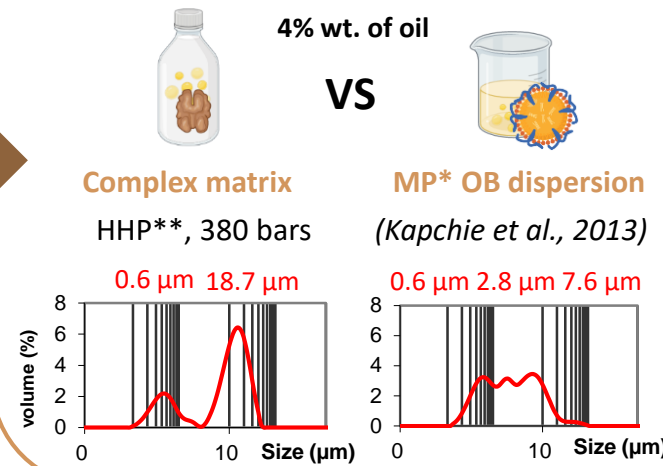
Two questions remain pressing: what is walnut OB's oxidative behavior and what are the consequences of oxidation on its interfacial reactivity?

What are OB?

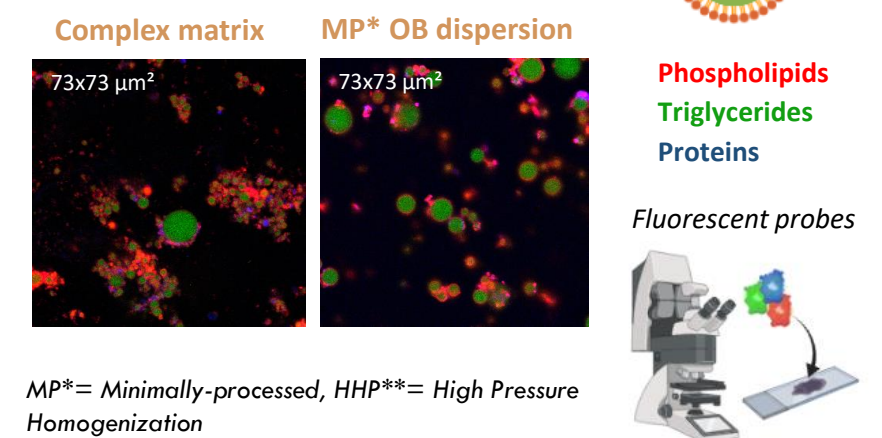


Material and methods

Matrix preparation

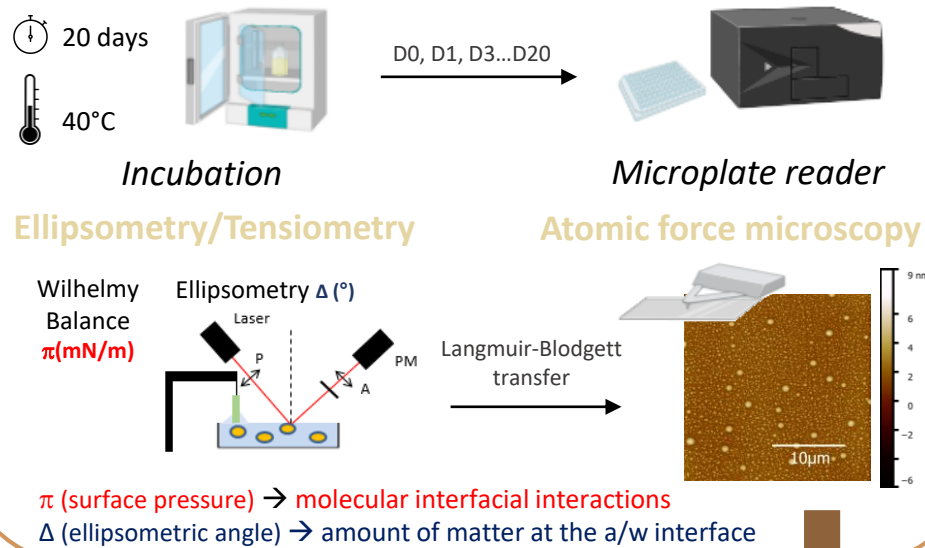


Confocal laser scanning microscopy



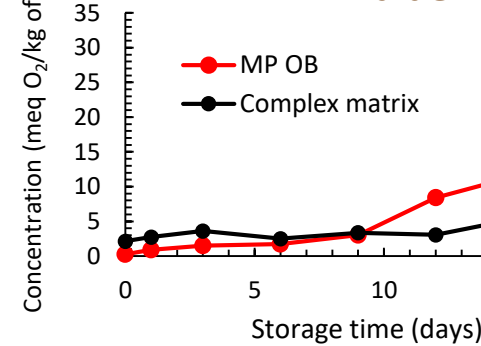
Material and methods

Oxidative challenge test (PV, TBARS)

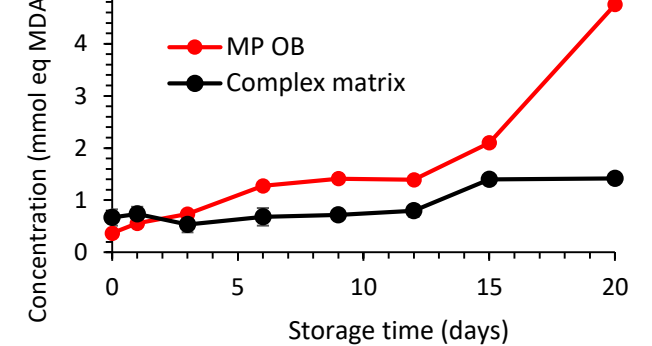


Results - Oxidative behavior

PV value



TBARS value

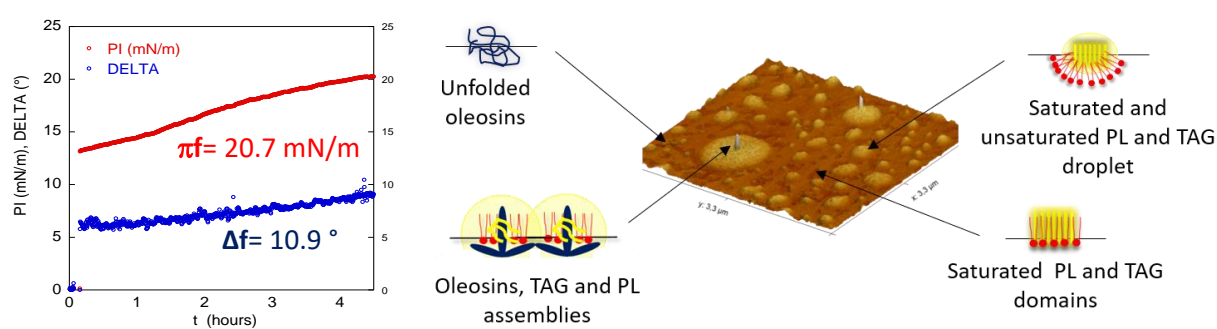


Conclusion: Walnuts OB were **stable to oxidation** on the short term (few days). This phenomenon is related to the "assembly effect" of OB and to their antioxidant content in **vitamins E** (41.0 ± 20.7 % wt.). The stability of the OB dispersion was higher under the complex matrix form due to the "matrix effect". (Huang et al., 1994)

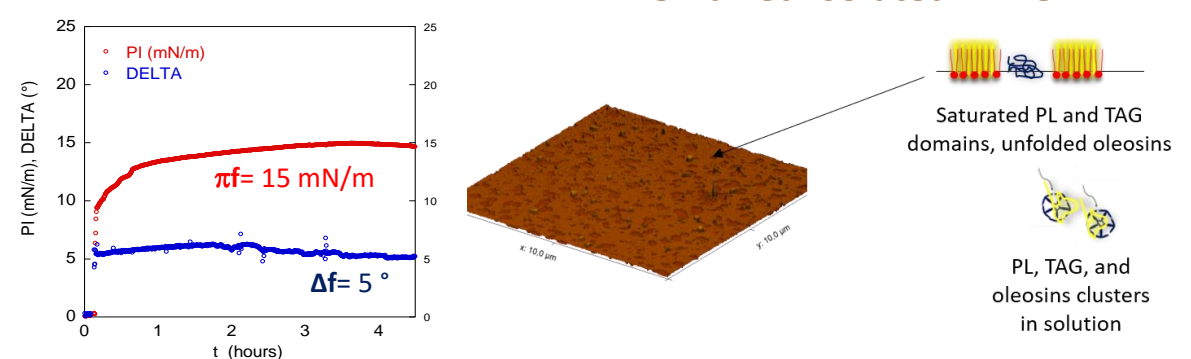
Results - Interfacial behavior

How does the **structural changes** of oxidized OB affect the behaviour at the interface?

Fresh Isolated MP OB



Oxidized Isolated MP OB



Conclusion: When MP OB adsorb at an air/water interface, the good cohesive ability of their native assembly allows them to keep intact their microstructure. **Oxidation phenomenon** modified the **physical integrity** of the OB, decreasing intermolecular forces, which resulted in a **different interfacial organization**.

(Kergomard et al., 2021)

Conclusion: Altogether, this study unveiled the **interesting stability of OB** and their **specific interfacial reactivity**, opening the way to the use of these natural lipoproteic assemblies in various food applications. *Nevertheless*, their physico-chemical stability during the design process should be taken into consideration. Indeed, the alteration of the physical structure of OB during processing may affect their chemical stability during storage and hence the quality of the final product expected by the consumer. This finding underlines the need to rethink food processing to preserve natural assemblies and their beneficial properties.

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