

## Development and characterization of oleogel foams based on monoglyceride and lecithin in vegetable oil.

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### INTRODUCTION & AIM

Low-fat food production, the delivery of pharmaceuticals, and cosmetics development have led to research and innovation in gas-in-oil systems (i.e., oleofoams) from vegetable-based formulations [1–3]. Foamability and stability depend on the self-assembled surfactant aggregates formed within the system's constituent phases, which are in turn influenced by the nature of the oil, the surfactant concentration, the surfactant's molecular structure, and the solubilization temperature [1]. Approaches to preparing ultra-stable edible oil foams are developed on the basis of oleogels, followed by an input of mechanical energy to generate an air-in-oil foam stabilized by preformed crystals [4]. The foams resulting from these formulations are stable against coalescence due to a rigid crystal layer surrounding the bubbles. The objective of this work was to develop stable foams based on monoglyceride (MG) and lecithin (LC) oleogels in vegetable oil for applications in the above systems.

### METHOD

#### MATERIALS



**Monoglyceride**  
Palsgard® DMG  
0093 (MG)

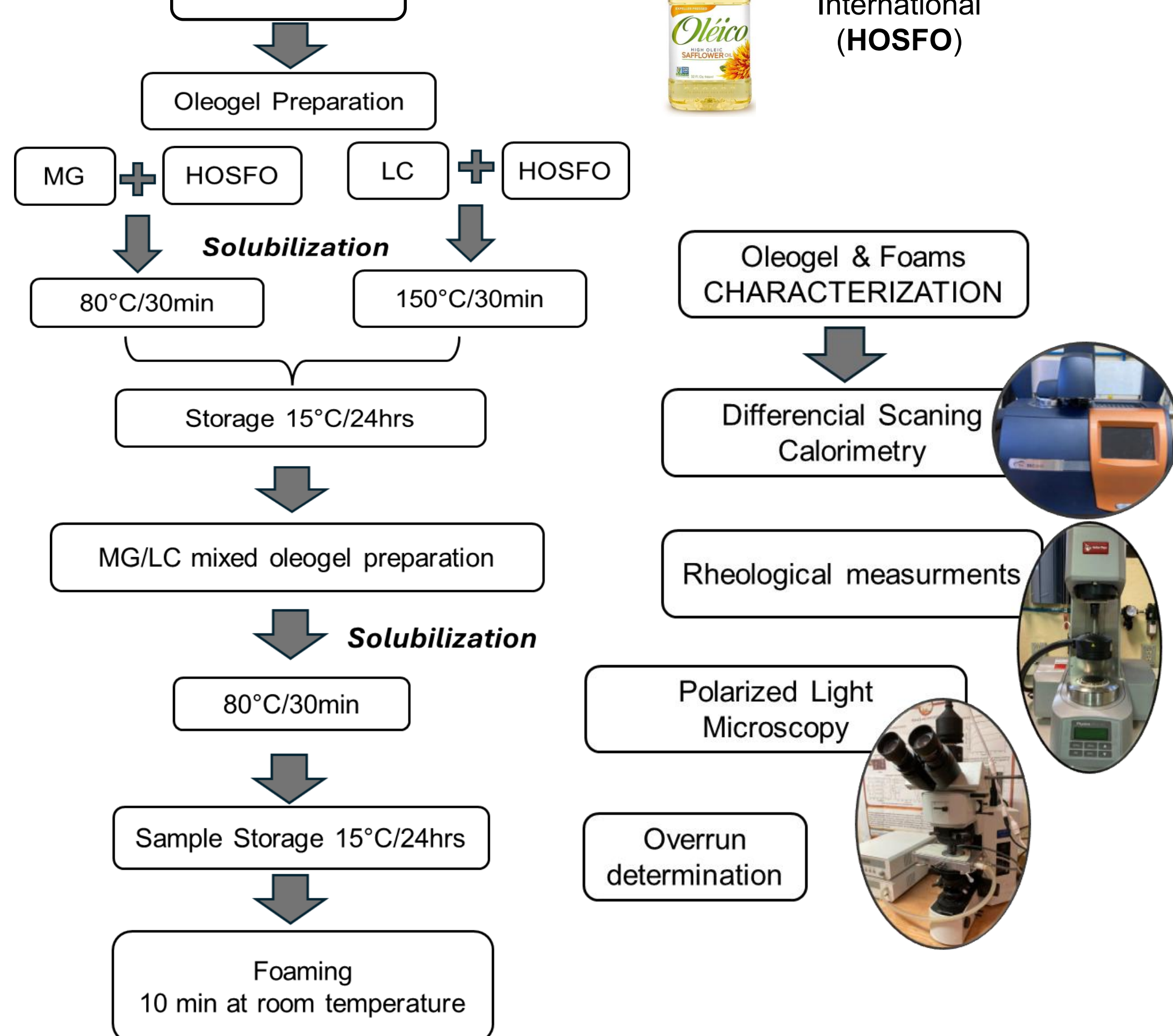


**Lecithin**  
Phospholipon 90H  
LIPOID™ (LC)

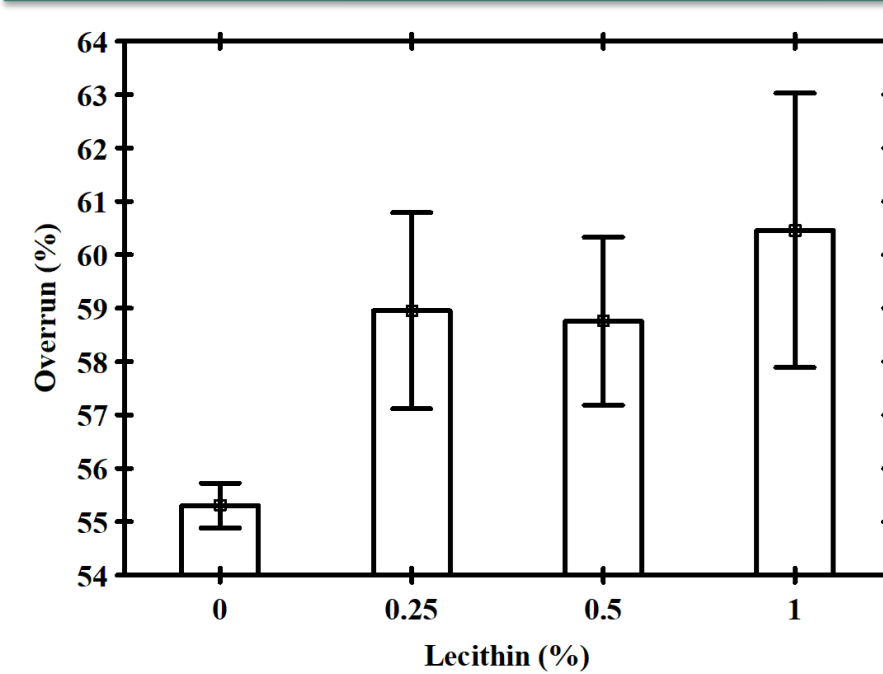


**High Oleic Safflower Oil, Coral International (HOSFO)**

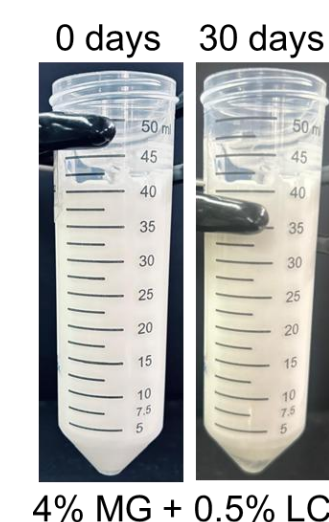
#### METHODS



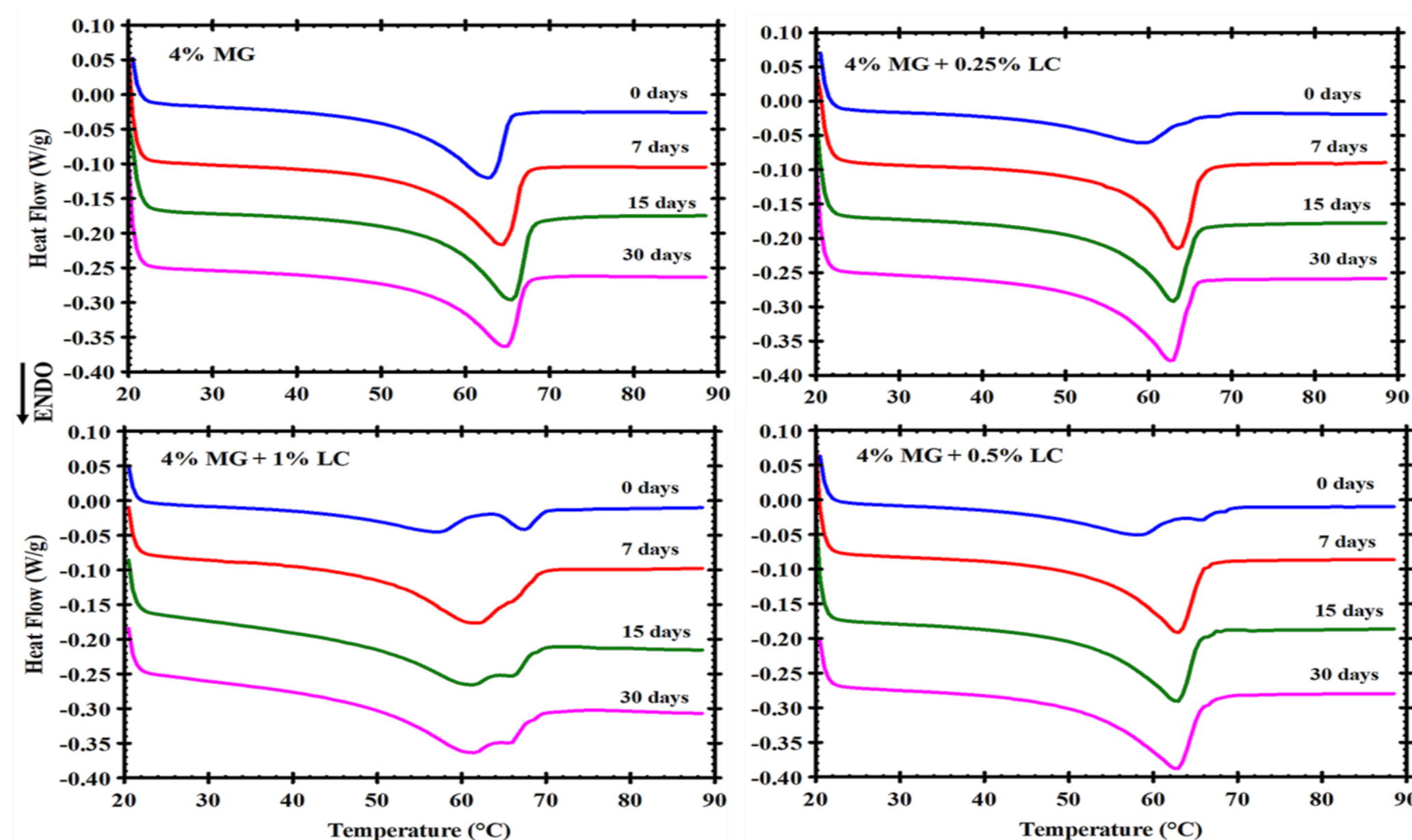
### RESULTS & DISCUSSION



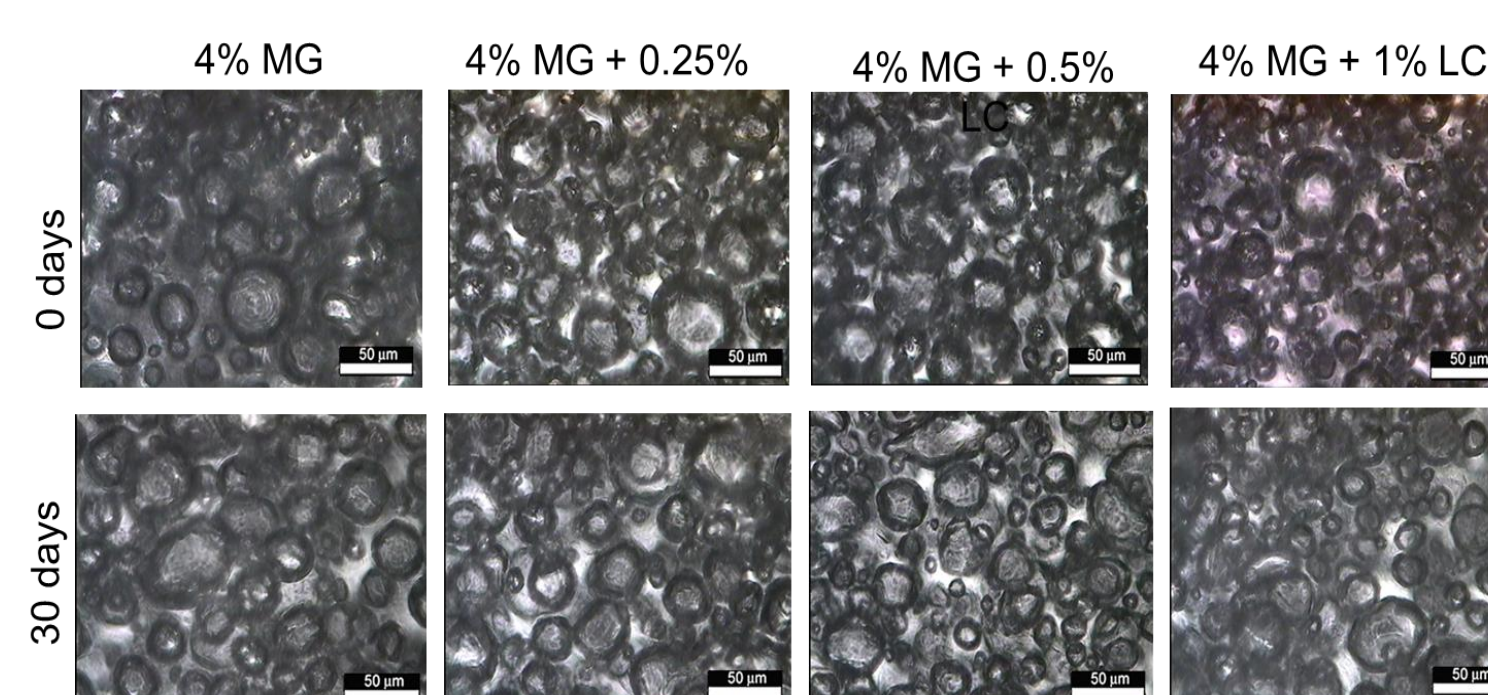
**Figure 1.** Overrun determination of the oleofoams formulated with 4%MG+LC.



**Figure 2.** Appreciation of the oil release over the storage time of one of the oleofoams developed.



**Figure 3.** Melting thermograms of the oleofoams formulated at the different storage time studied.



**Figure 4.** Comparison of Oleofoam's microstructure observed after its preparation (0 days) and at 30 days of storage at room temperature (~25°C).

The foam volume doubled the initial volume of the oleogel (i.e., 20 mL to 40 mL), remaining this way for up to 7 days. During this period, 2.5 to 3 mL of oil volume had been released. The foam remained stable for up to 30 days without collapsing. The melting temperature ( $T_M$ ) of each formulation studied was statistically the same after 7 days until 30 days of storage ( $p > 0.05$ ); the  $T_M$  was higher when the concentration of LC increased in the formulation. The foam rheology increased during storage (e.g., 4%MG+0.25%LC at 0 days: 953 Pa  $\pm$  156, 7 days 20240 Pa  $\pm$  1386, 30 days: 27580 Pa  $\pm$  3167; 4%MG+1%LC at 0 days 288 Pa  $\pm$  66, 7 days 14330 Pa  $\pm$  156, 30 days 21610 Pa  $\pm$  382) as the loss oil was released slowly. The foam consisted of a mixed network of MG-LC crystals, situated in the border or around the air droplets, which remained stable for 30 days.

### CONCLUSION

This research work allowed us to propose an alternative material based on a stable oleofoam formulated by MG-LC in vegetable oil for the structuration and/or formulation of food, cosmetic, or pharmaceutical systems. For future work, it is proposed to stabilize the foam for a longer period and to carry out applied development in one of the areas mentioned.

### REFERENCES

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