OLEOGELS FROM HIGH INTERNAL PHASE EMULSION TEMPLATES STABILIZED BY SODIUM CASEINATE-ALGINATE COMPLEXES

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Background

- Trans and saturated fats reduction

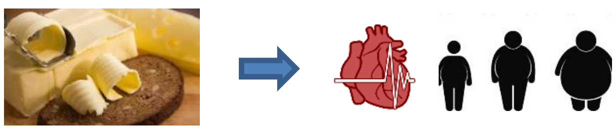


Figure 1. High dietary intake of trans-fat increases high risk of cardiovascular diseases and obesity .

- Nutritional profile optimization: saturated and trans-fats -> MUFAs and PUFAs (liquid oils)
- Structuring liquid oils into 3D networks, e.g. biopolymer-based oleogelation facing technical challenges such as textural and stability maintenance

Figure 2. Application of oleogels in food products, such as oleogel based spread, palm oil replacement in chocolate, and oleogel as shortening (Patel, A.R, 2015).

Oleogels preparation

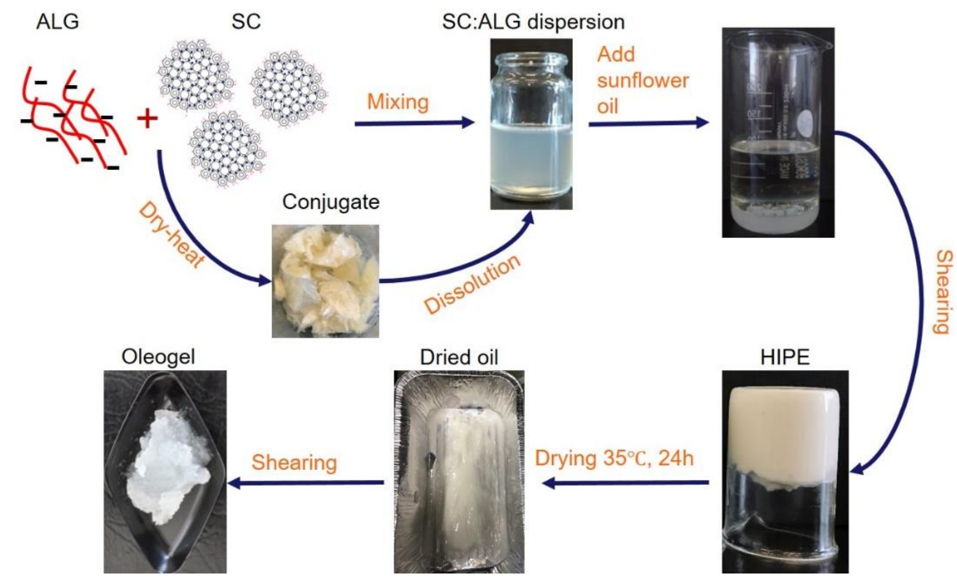


Figure 3. Schematic illustration of oleogel preparation from emulsion template stabilized by SC:ALG mixture and conjugate.

Results

- ***Droplet size distribution of HIPEs***

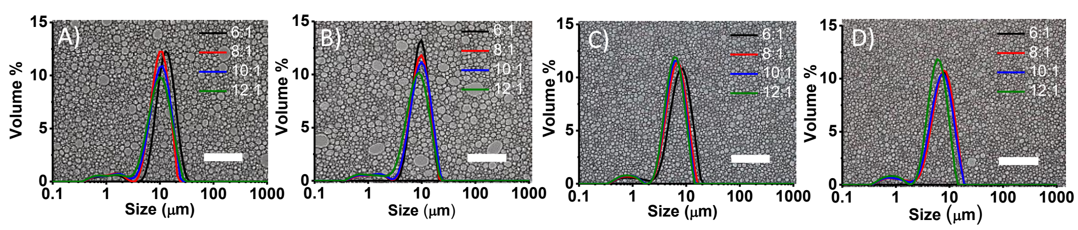


Figure 4. Droplet size distribution (µm) of HIPEs stabilized by SC:ALG mixtures at pH 5.5 (A), 6.0 (B), 7.0 (C), and SC:ALG conjugates (D). Scale bar is 50 µm.

- Increasing pH and protein ratio→ decrease droplet size

- ***Microstructure of HIPEs and oleogels***

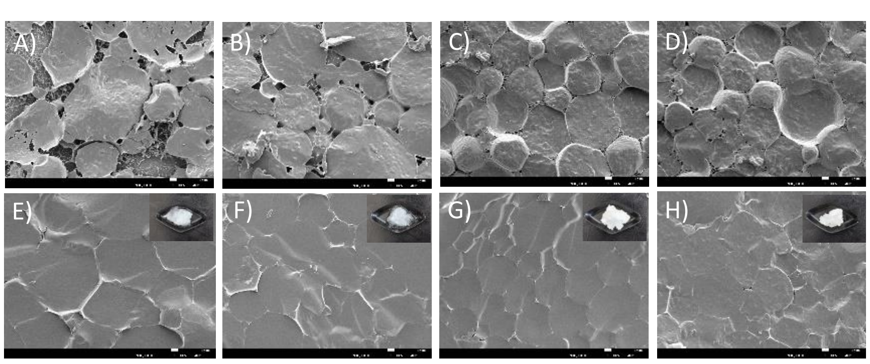


Figure 5. Cryo-SEM images of HIPEs and oleogels stabilized by SC:ALG (12:1) at pH 5.5 (A-E), 6.0 (B-F), 7.0 (C-G), and SC:ALG conjugate (D-H). Scale bar is 1 µm.

- Increasing pH → decrease evidence of coalescence (oil droplets rupture) in HIPEs, leading to stronger interpolymeric networks and a tightly packed of oil droplets in oleogels.

- ***Rheology characterization of HIPEs and emulsions***

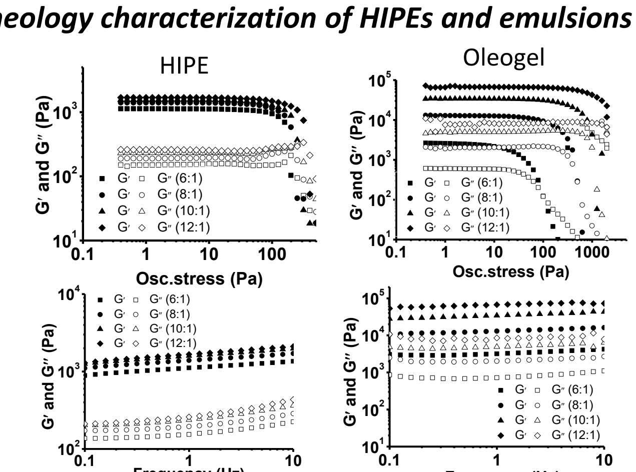
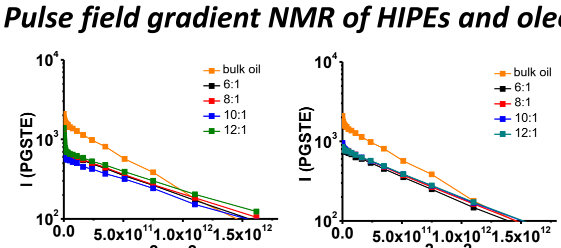


Figure 6. G′ and G′′ as a function of oscillatory. stress and frequency for HIPEs and oleogels stabilized by SC:ALG mixture at pH 7.0

- G'>G" → solid behaviour
- Increasing protein ratio → stronger gel
- No significant effect from pH variation
- Relatively flat slope (frequency) → good resistance to deformation

- ***Pulse field gradient NMR of HIPEs and oleogels***



- Slower diffusion decay than bulk oil
- pH increased → slower diffusion decay

Figure 7. PGSTE diffusion signal of HIPE and oleogel stabilized by SC:ALG mixture at pH 7.0

Acknowledgement
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