Supplementary Material

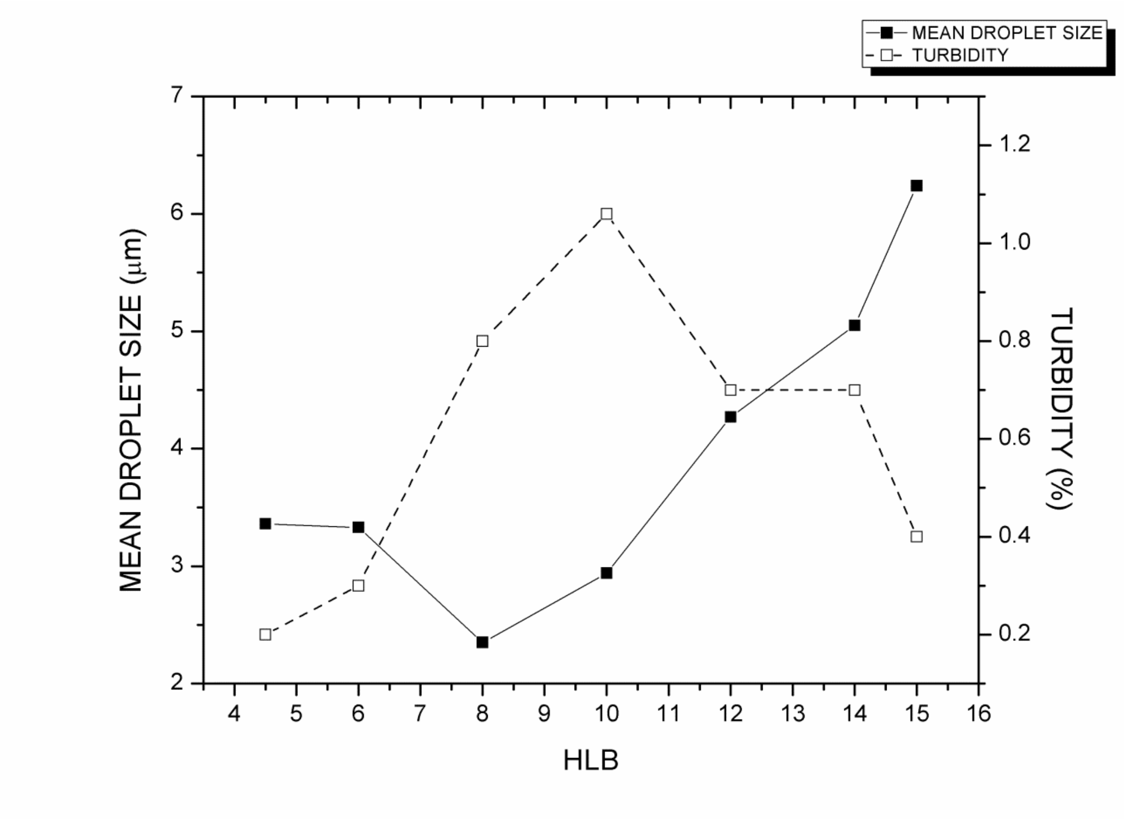

Fig. S1. Droplet size and turbidity as a function of HLB. The values from 8 to 10 showed the smallest droplet size and the highest turbidity, which is indicative of more stable emulsions.

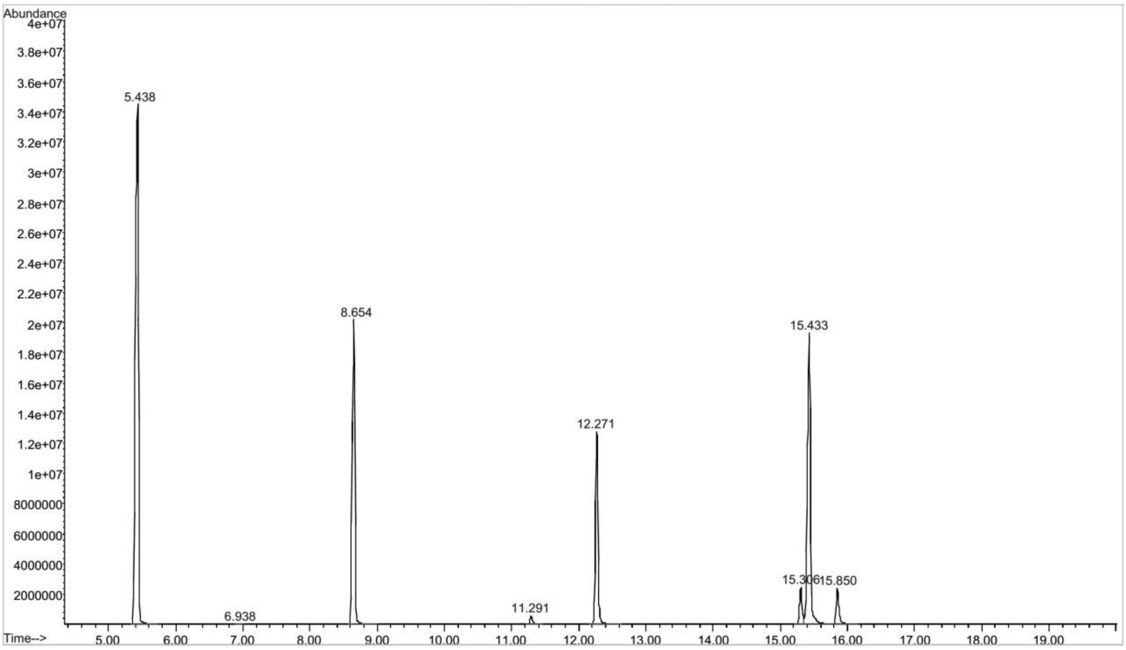

Fig. S2. GC-MS chromatogram of the babassu oil fatty acids.

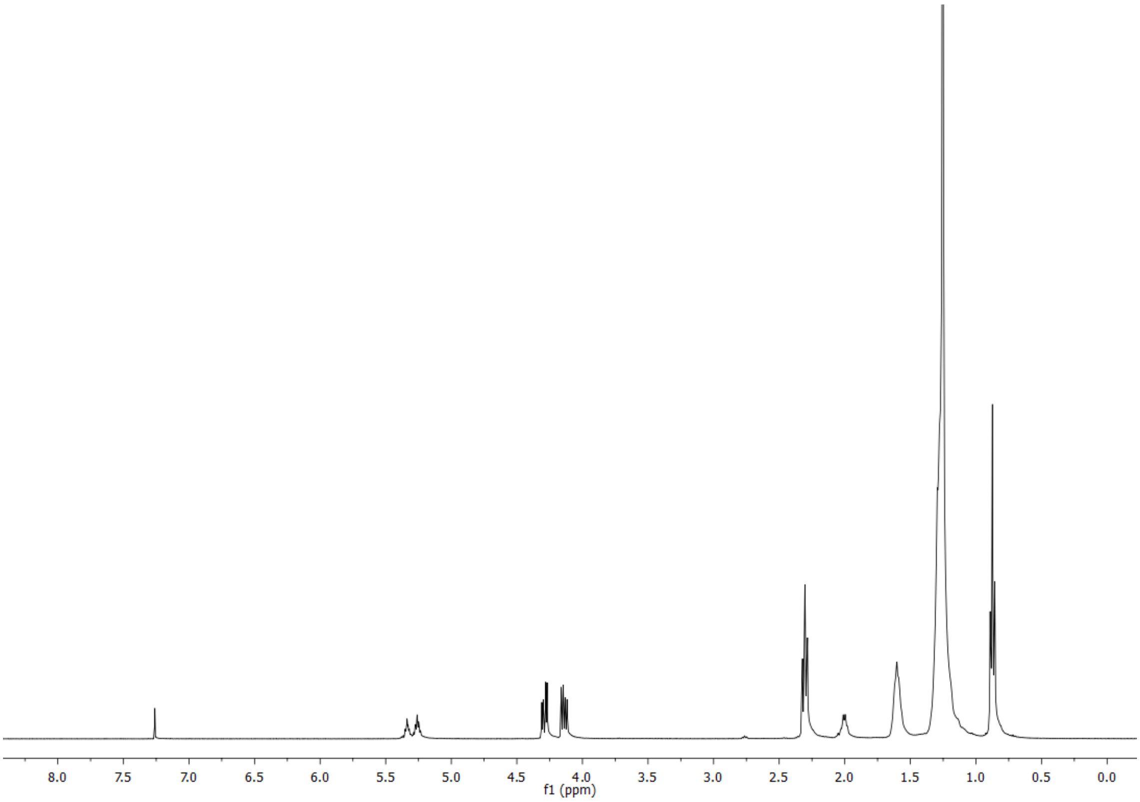

Fig. S3. ^{1}H NMR spectrum of the babassu oil sample in $CDCl_3$.

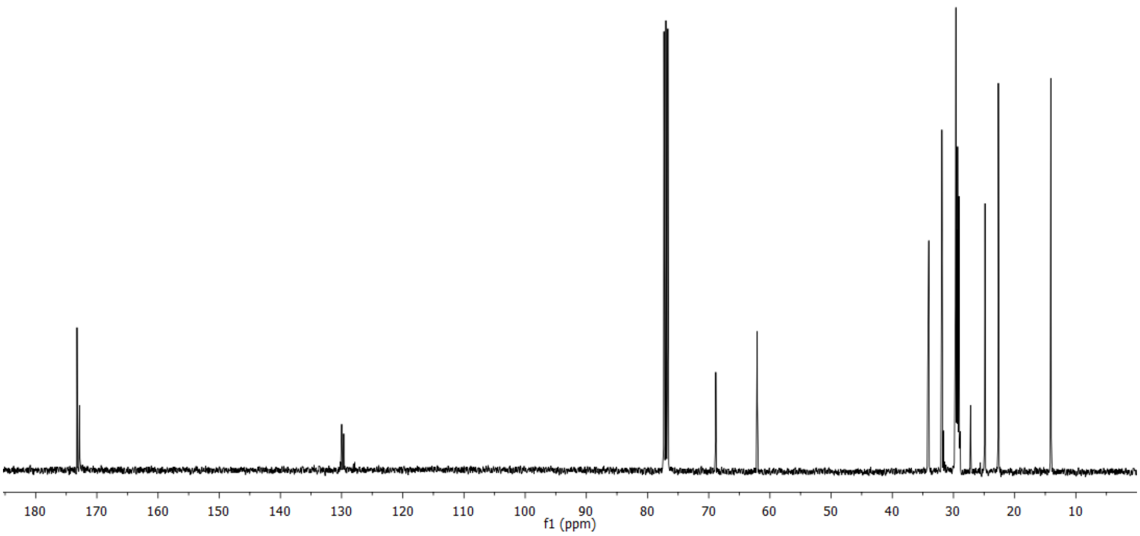

Fig. S4. ^{13}C NMR spectrum of the babassu oil sample in $CDCl_3$.

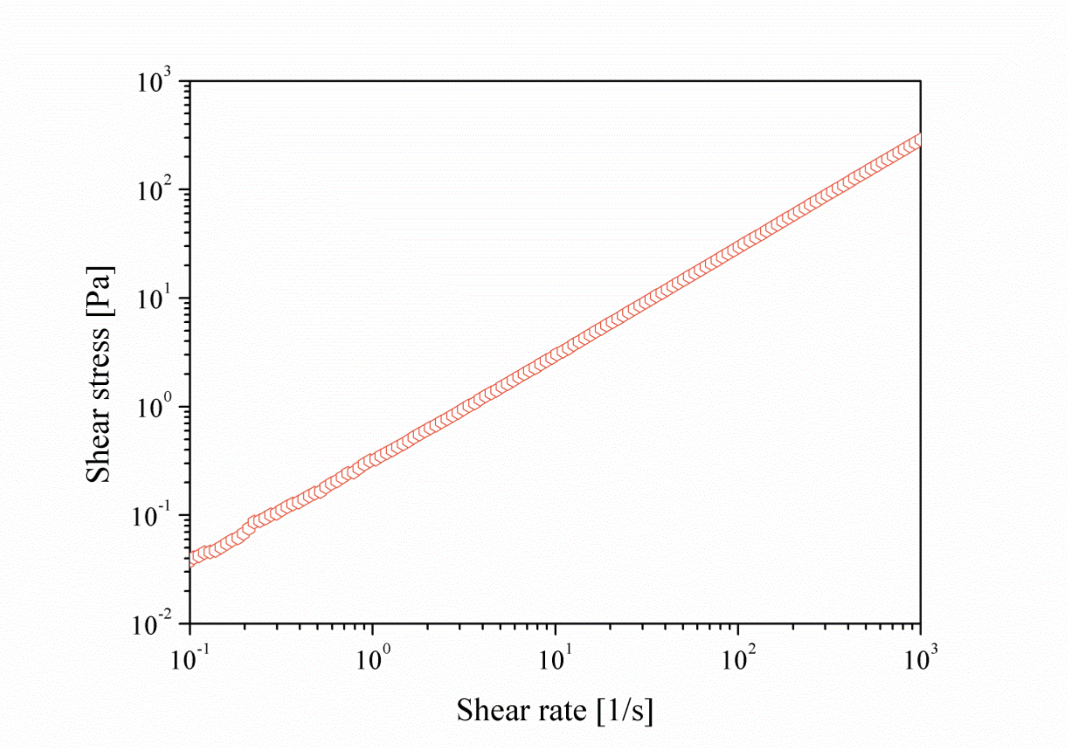

Fig. S5. Microemulsion rheological curve showing Newtonian behavior.

Table S1. Centrifugation study to investigate the stability of Babassu microemulsion.

Parameter	**Before centrifugation**[1]	**After centrifugation**[1]
pH[2]	6.7	7.13
Conductivity[3] ($\mu S.cm^{-1}$)	19.67	21.59
Droplet size[4] (nm)	48.64	50.68

[1] The centrifugation study was carried out at 15000 rpm for 30 min (NI 1801 centrifuge, Nova Instruments, Brazil).

[2] mPA210, Tecnopon, Brazil.

[3] mCA150, Tecnopon, Brazil.

[4] ZEN3690, Malvern instruments, United Kingdom.

Table S2. Heating stress applied to babassu microemulsion to check stability in the temperature range 40-80 °C.

Parameter	**Before stress**	**40 °C**	**50 °C**	**60 °C**	**70 °C**	**80 °C**
pH[1]	6.7	6.7	-	-	-	6.4
Conductivity[2] ($\mu S.cm^{-1}$)	19.67	0.69	-	-	-	1.12
Droplet size[3] (nm)	48.64	50.94	-	-	-	50.94
Instability (cracking, creaming and phase separation)	Absence					

[1] mPA210, Tecnopon, Brazil.

[2] mCA150, Tecnopon, Brazil.

[3]ZEN3690, Malvern instruments, United Kingdom.

Table S3. Heating–cooling cycles to check the effect of temperature variations on the stability of babassu microemulsion.

Cycles[*] 1, 2, 3 and 4	
4 °C	Frozen microemulsion
40 °C	No instability

[*]Heating–cooling cycles for a period of 24h.

SAXS equations

The intensity I(q) of the microemulsion can be analyzed according to a general expression as follows [1,2]:

$$I(q) \propto \langle F(q) \rangle^2 S(q) + \langle F(q)^2 \rangle - \langle F(q) \rangle^2 + I_{bg} \quad \text{(S1)}$$

where I_{bg} is the background intensity, $F(q)$ is the form factor and $S(q)$ is the structure factor. $\langle F(q) \rangle$ describes the polydisperse shape of the droplets, where the average is determined using a Lognormal distribution.

A form factor of the spherical core-shell that is separated by a correlation distance (R_{HS}) can be adopted. This form factor is parameterized with an outer radius R and an inner radius νR. The scattering contrast relative to the matrix of the core was μΔη and the difference between the matrix and the shell was Δη [1,2].

$$F(q,R,\nu,\Delta\eta,\mu) = (K(q,R,\Delta\eta) - K(q,\nu R,\Delta\eta(1-\mu)))^2 \quad \text{(S2)}$$

with

$$K(q,R,\Delta\eta) = \frac{4}{3}\pi R^3 \Delta\eta 3 \frac{\sin qR - qR\cos qR}{(qR)^3} \quad \text{(S3)}$$

In equations S2 and S3, R is the overall radius of the spherical shell, ν is the fraction of the overall radius, Δη is the scattering length density difference between the shell and matrix and μ is the scattering length density difference between the core and matrix relative to the shell contrast (Fig. 5 (a)). S(q) describes the spatial correlation between the droplets. In this work was used the hard sphere function to estimate the correlation length between droplets. The hard sphere function has been successfully used in many microemulsion studies [3-5]. However, R_{HS} is the independent radius of the core and can be interpreted as the interaction radius [6]. Experimental SAXS data were fitted using the software SASFIT® [7].

References

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