Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.

Supporting Information

Table S1: Final saponification rate τ_S of linseed oil samples heated at 150°C with PbO as a function of the initial amount of PbO.

PbO (mol%)	4	17	31	50	57
τ_S (%)	3 ± 0	18 ±2	33 ± 3	59 ± 4	72 ± 1

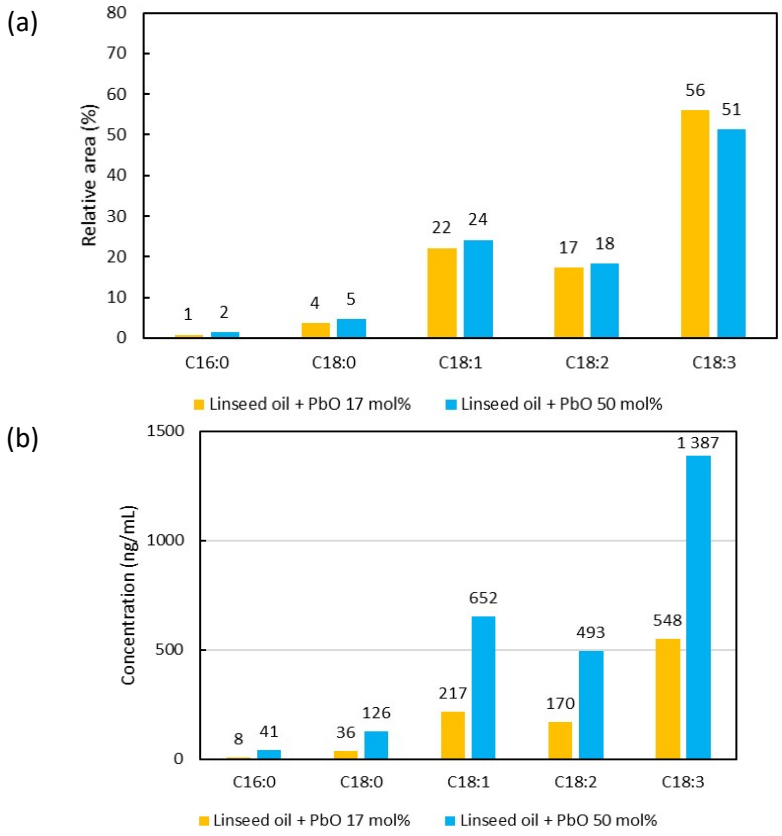
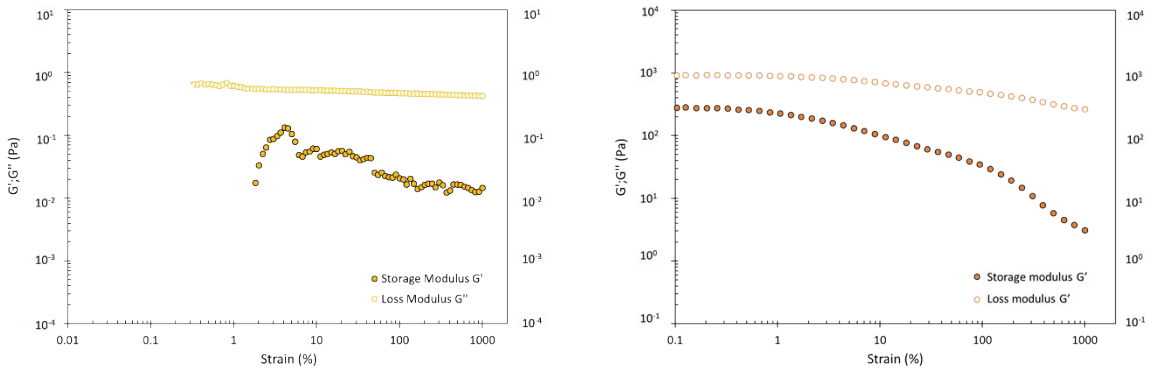


Figure S1: (a) Distribution of fatty acid chains from lead soaps and free fatty acids obtained by GC-MS (Gas Chromatography – Mass Spectrometry) after derivatization with BSTFA. The method used is described below. (b) corresponding absolute concentration in ng/ml.

Samples of saponified oils were weighed into a flask and successive dilutions in heptane were performed to obtain a 40 µg/L concentrated solution. 20 µL of a BSTFA (bis(trimethylsilyl)trifluoroacetamide) solution (Supelco) were added to 150 µL of the diluted solution, and the mixture was heated at 90°C (± 5°C) for 80 min. The use of BSTFA as a derivatizing agent allows to probe specifically the distribution of the fatty acid chains from soaps and free fatty acids.[1,2] The resulting solution was delivered to the injector of an Agilent 7890B-GC system (Agilent Technologies) coupled to an Agilent MSD 5977B single quadrupole mass spectrometer (Agilent Technologies). Volatile compounds were separated with a HP-5MS column (30 m x 0.25 mm x 0.25 µm, Agilent Technologies) subjected to the following temperature gradient: 80°C for 2 min, then 15°C/min to 280°C, followed by an isotherm at 280°C for 10 min. For all samples, the injection was performed in splitless mode. The injection volume was 1 µL, the injector temperature was set at 280°C and the flow rate of the carrier gas (helium) at 1.5 mL/min. For detection, electron impact ionization was performed.

The electron energy was 70 eV. The temperature of the ion source was 250°C, that of the quadrupole 150°C. The range of m/z ratios scanned was 50 to 700, at a frequency of 2.3 scans/s. Absolute quantification of free fatty acids have been performed using calibration curves from 2 to 1000 ng/mL after sample derivatization.



(a) (b)

Figure S2: Oscillatory strain sweep test from 0.05 to 1000 % (f = 1 Hz) on linseed oil + PbO (a) 17 and (b) 57 mol%.

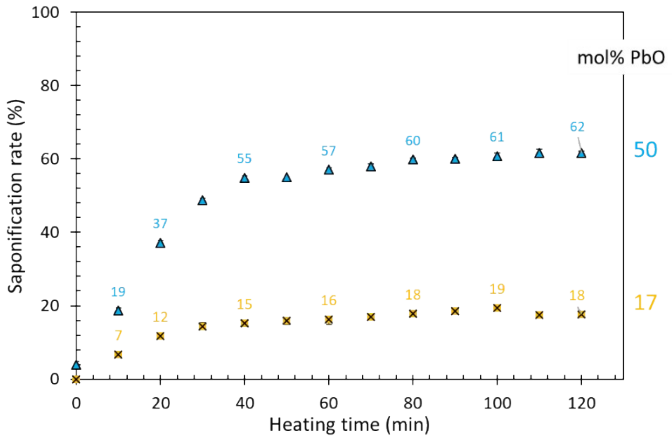


Figure S3: Evolution of saponification rate during heating of linseed oil containing 17 and 50 mol% PbO. Error bars are included in the size of the symbols used.

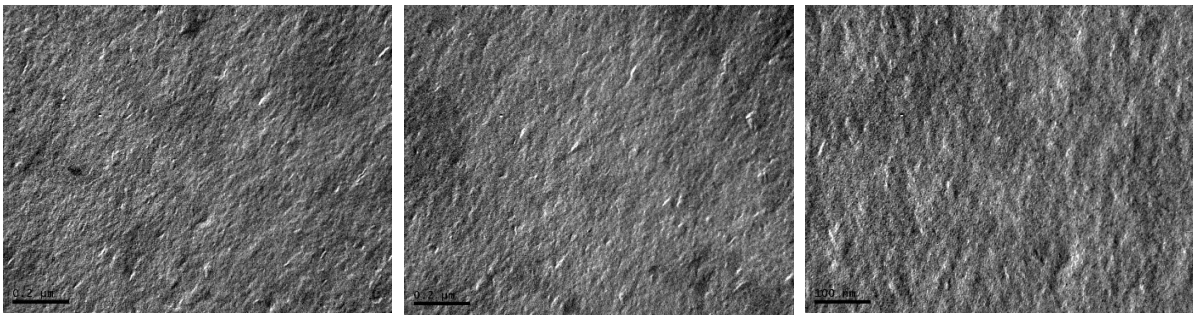


Figure S4: FF-TEM images of linseed oil alone.

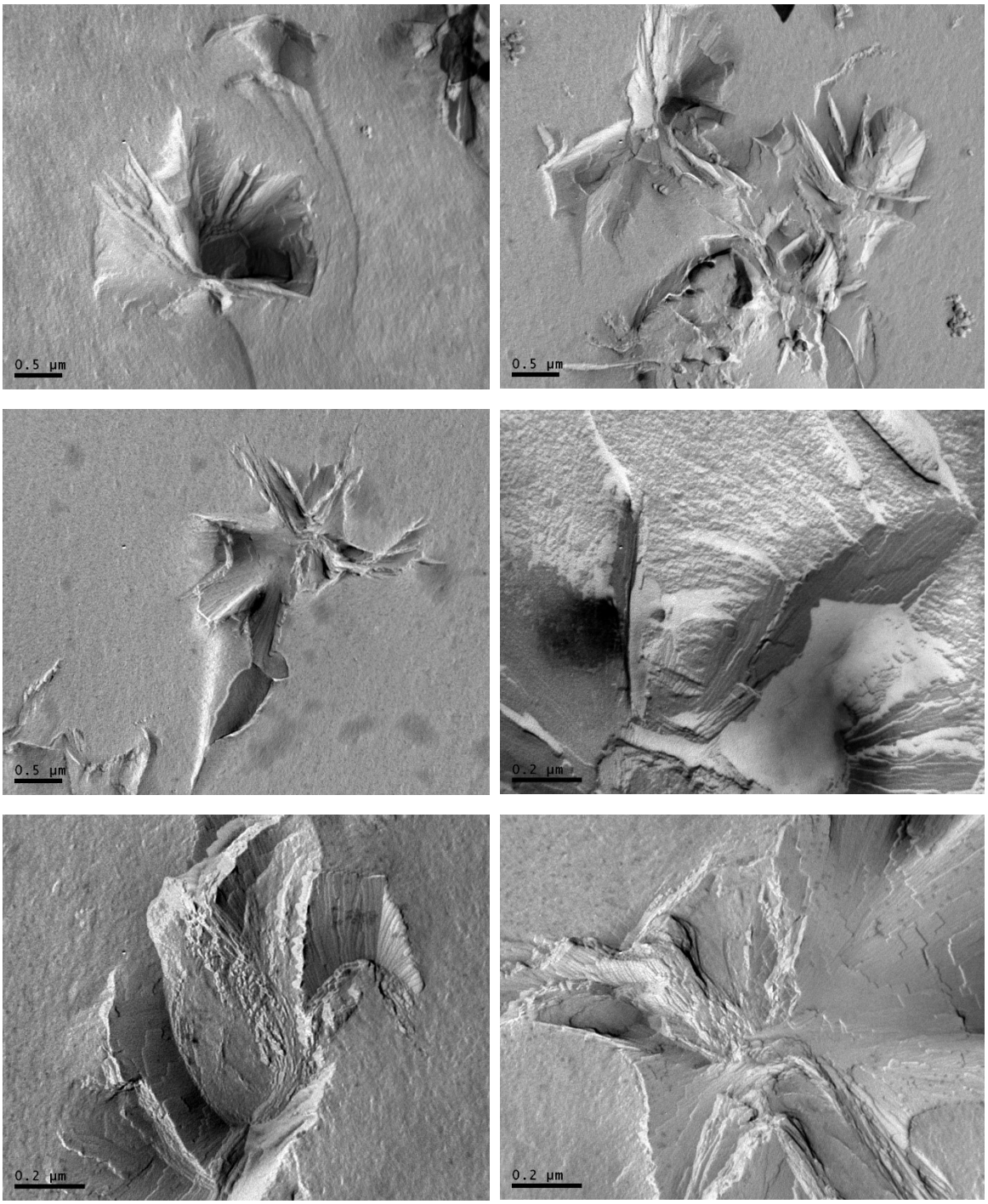


Figure S5: FF-TEM images of linseed oil + PbO 17 mol%

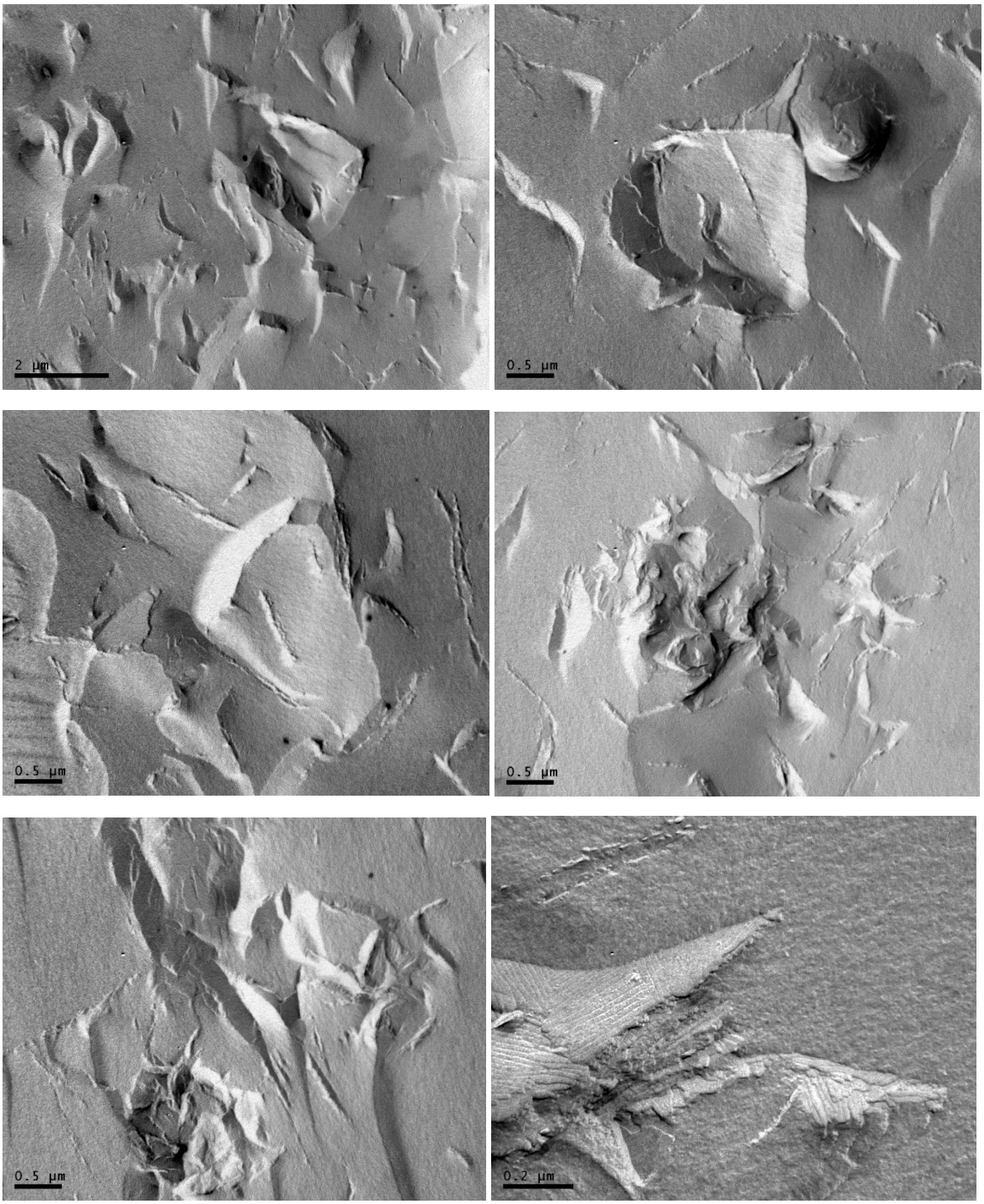


Figure S6: FF-TEM images of linseed oil + PbO 50 mol%

References:

1. J. La Nasa, F. Modugno, M. Aloisi, A. Lluveras-Tenorio and I. Bonaduce, *Anal. Chim. Acta*, 2018, **1001**, 51–58.
2. J. La Nasa, A. Lluveras-Tenorio, F. Modugno and I. Bonaduce, *Heritage Sci.*, 2018, **6**, 57.