

Analysis of the Thermal Aging Kinetics of Tallow, Chicken Oil, Lard, and Sheep Oil

Yun-Chuan Hsieh ¹⁾, Hao Ouyang ¹⁾, Yulin Zhang ²⁾, Donyau Chiang ³⁾, Fuqian Yang ⁴⁾,
Hsin-Lung Chen ⁵⁾, Sanboh Lee ^{1),*}

- 1) Department of Materials Science and Engineering, National Tsing Hua University,
Hsinchu 300, Taiwan
- 2) Chongqing Institute of Green and Intelligent Technology, Chinese Academy of Sciences,
Chongqing 400714, China
- 3) National Applied Research Laboratories, Taiwan Instrument Research Institute,
Hsinchu 300, Taiwan
- 4) Materials Program, Department of Chemical and Materials Engineering,
University of Kentucky, Lexington, KY 40506, USA
- 5) Department of Chemical Engineering, National Tsing Hua University,
Hsinchu 300, Taiwan

* Corresponding author. Email: sblee@mx.nthu.edu.tw; Telephone/Fax: +88635719677

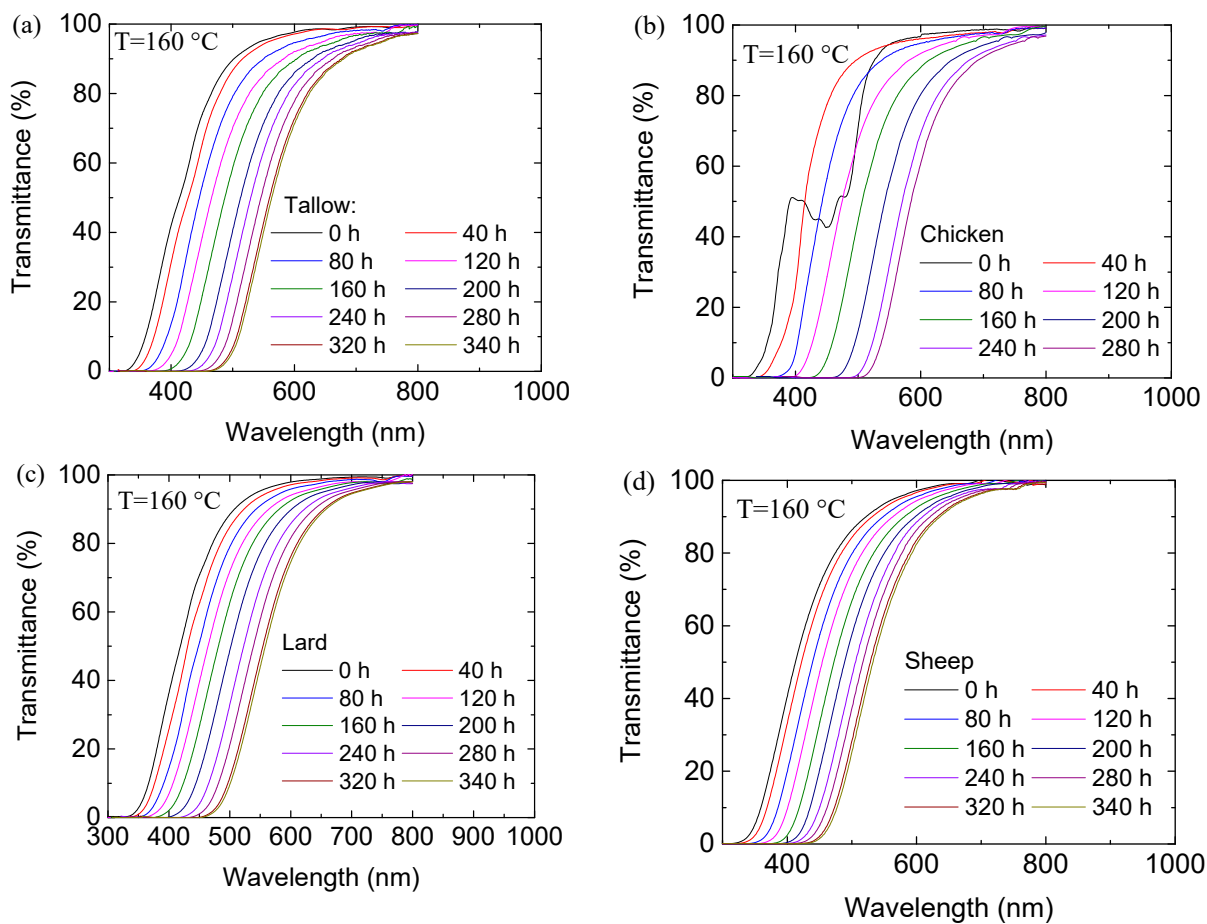


Figure S1. Transmittance spectra of the animal oils at 160 °C for different durations: **(a)** tallow, **(b)** chicken oil, **(c)** lard, and **(d)** sheep oil.

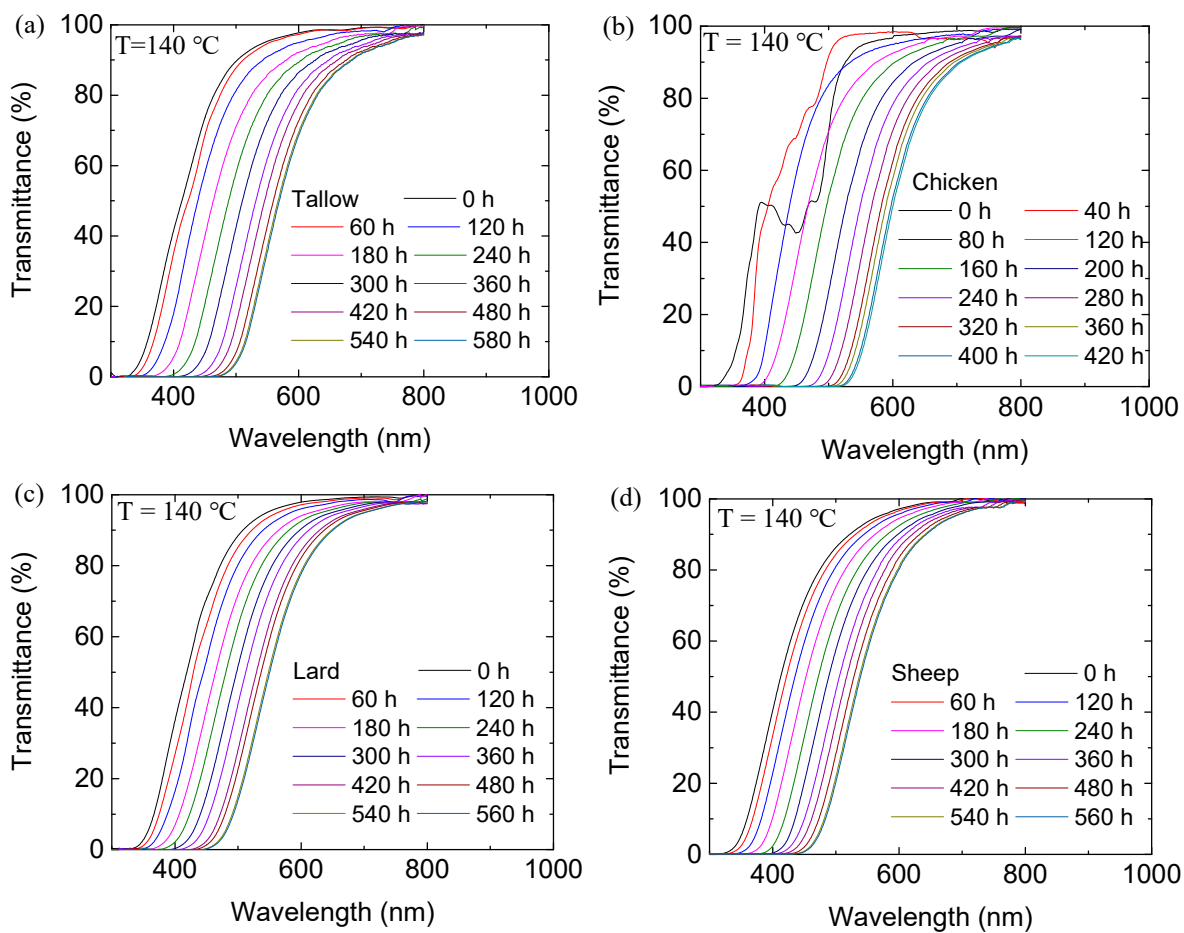


Figure S2. Transmittance spectra of the animal oils at $140\text{ }^{\circ}\text{C}$ for different durations: **(a)** tallow, **(b)** chicken oil, **(c)** lard, and **(d)** sheep oil.

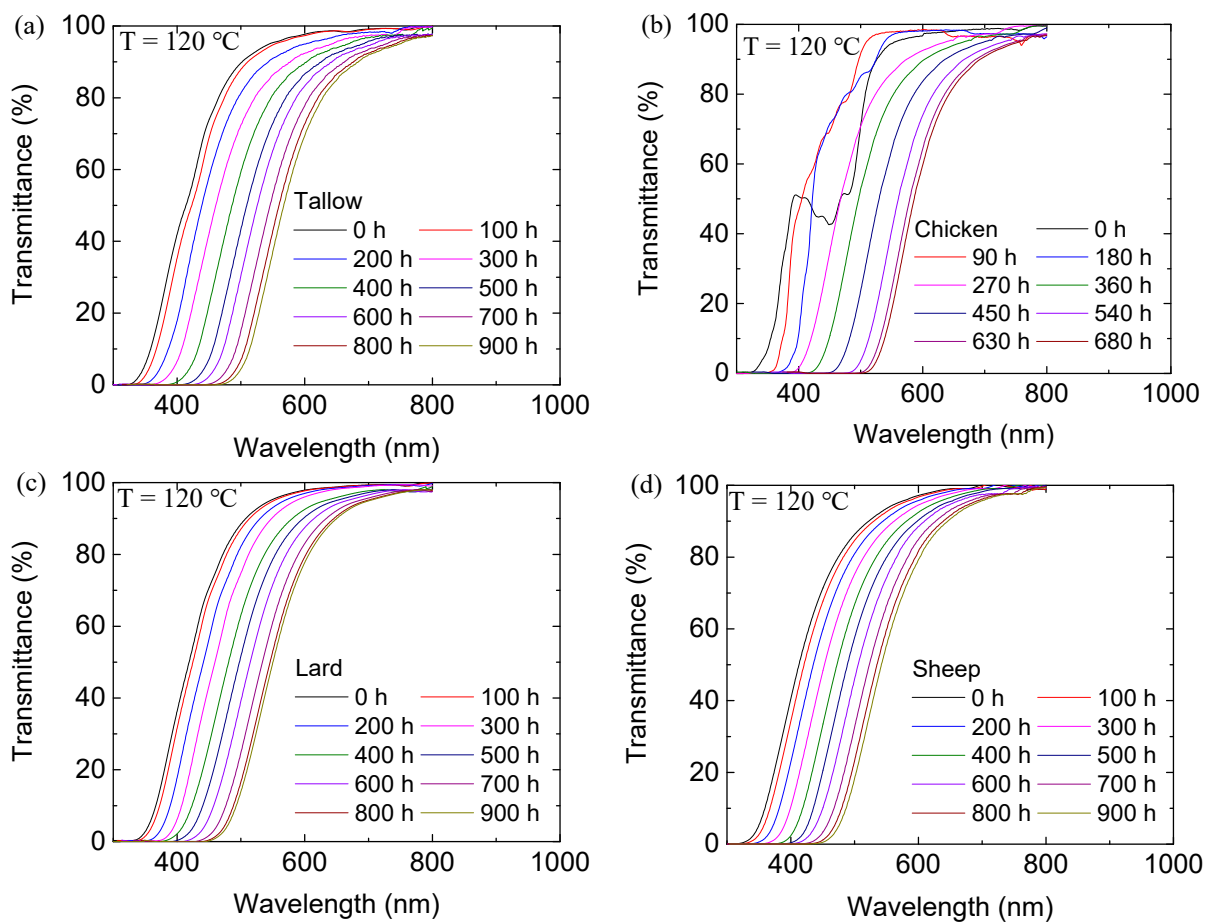


Figure S3. Transmittance spectra of the animal oils at 120 °C for different durations: **(a)** tallow, **(b)** chicken oil, **(c)** lard, and **(d)** sheep oil.

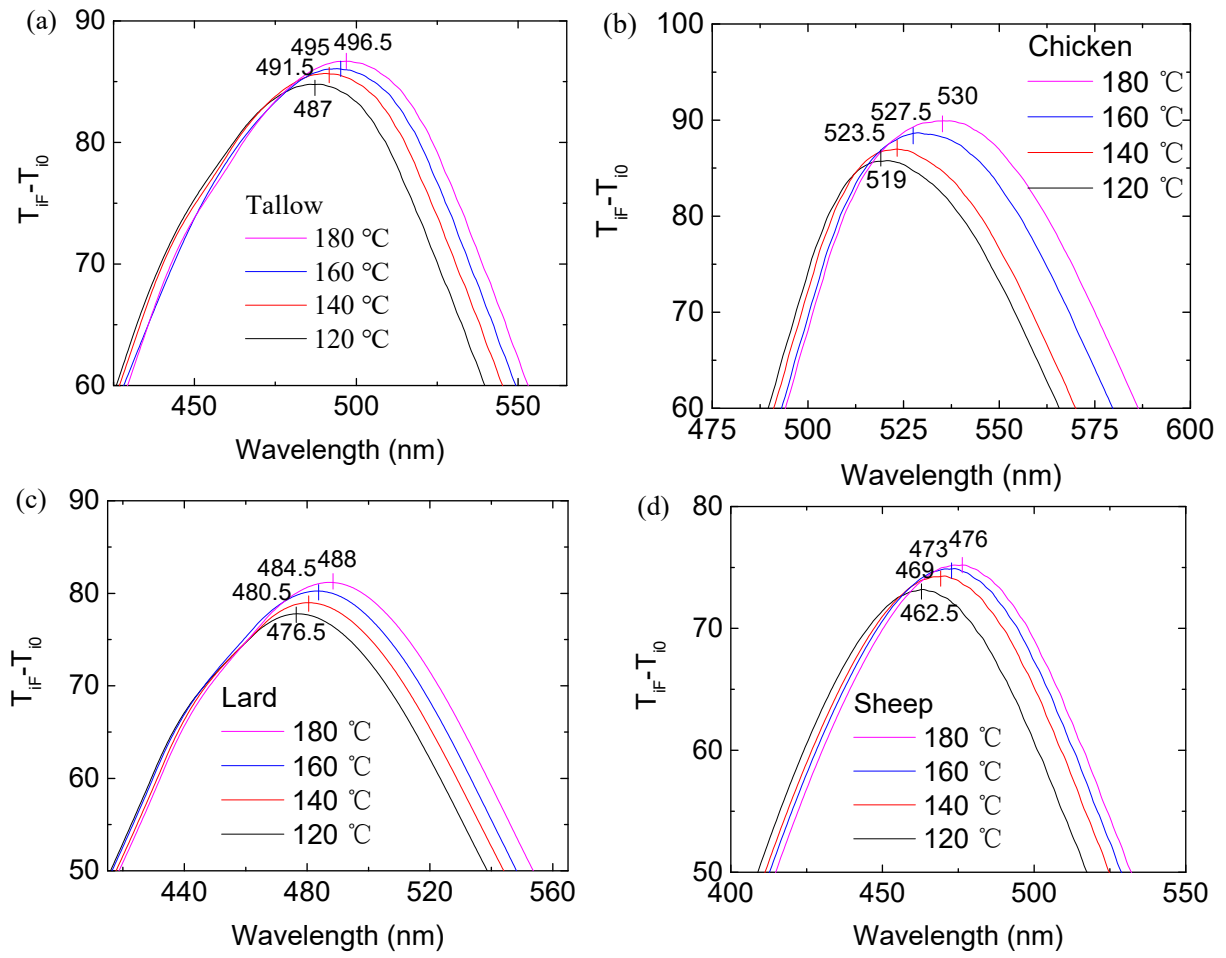


Figure S4. Variation of maximum difference of transmittances at the initial time and final time with wavelength at different temperatures: **(a)** tallow, **(b)** chicken oil, **(c)** lard, and **(d)** sheep oil.

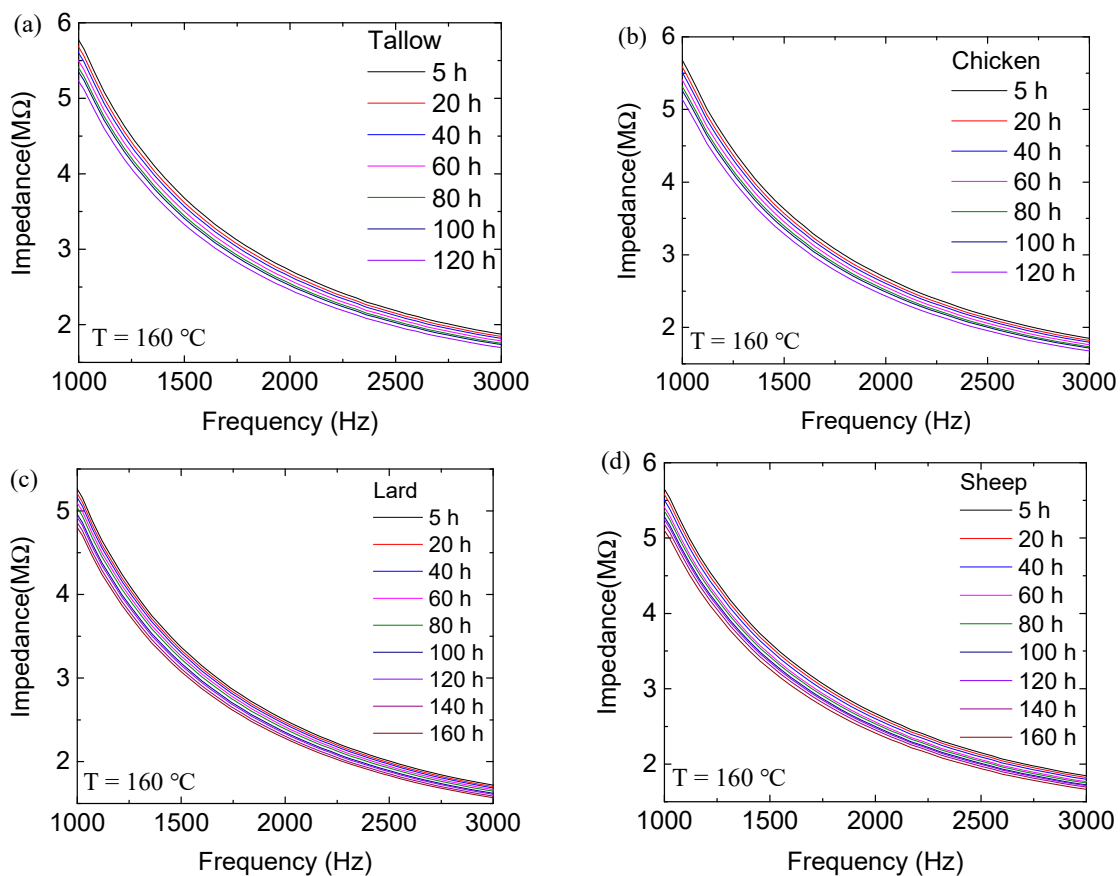


Figure S5. Frequency dependence of electric impedances of the animal oils at 160 °C at different heating times: (a) tallow, (b) chicken oil, (c) lard and (d) sheep oil.

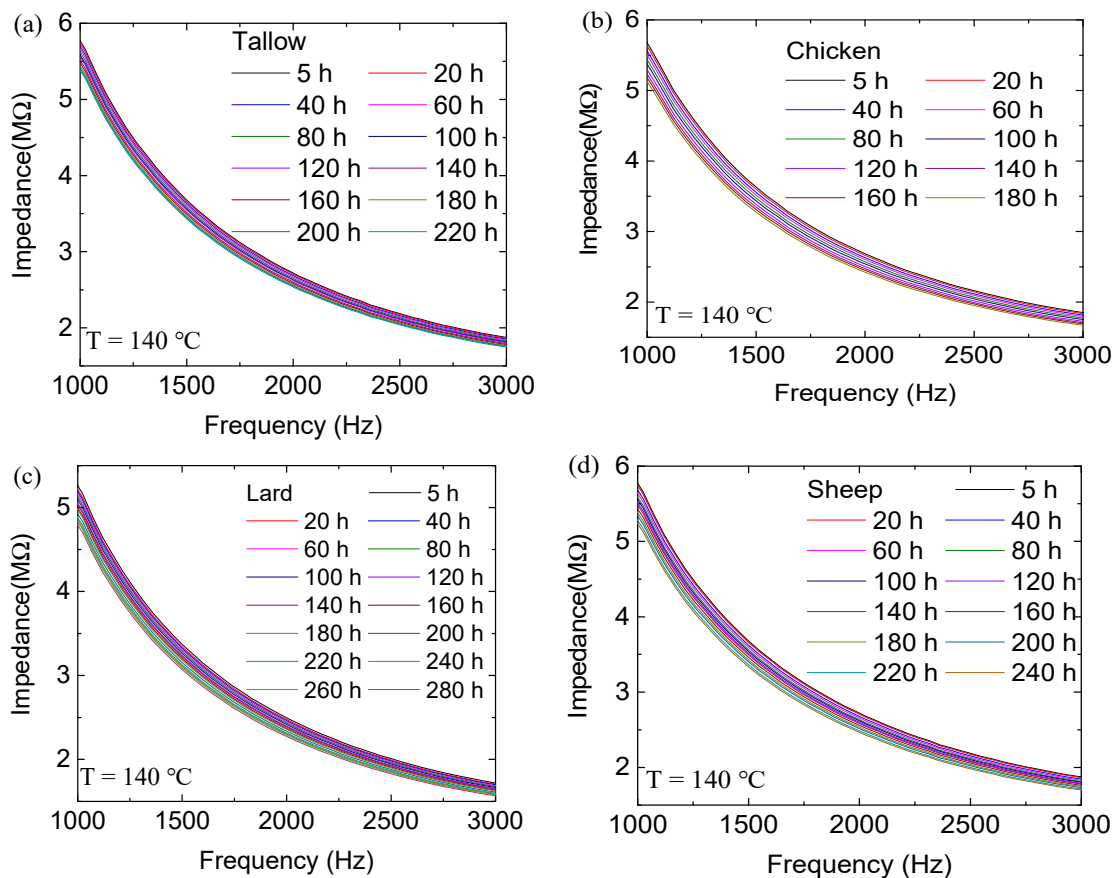


Figure S6. Frequency dependence of electric impedances of the animal oils at 140 °C at different heating times: **(a)** tallow, **(b)** chicken oil, **(c)** lard, and **(d)** sheep oil.

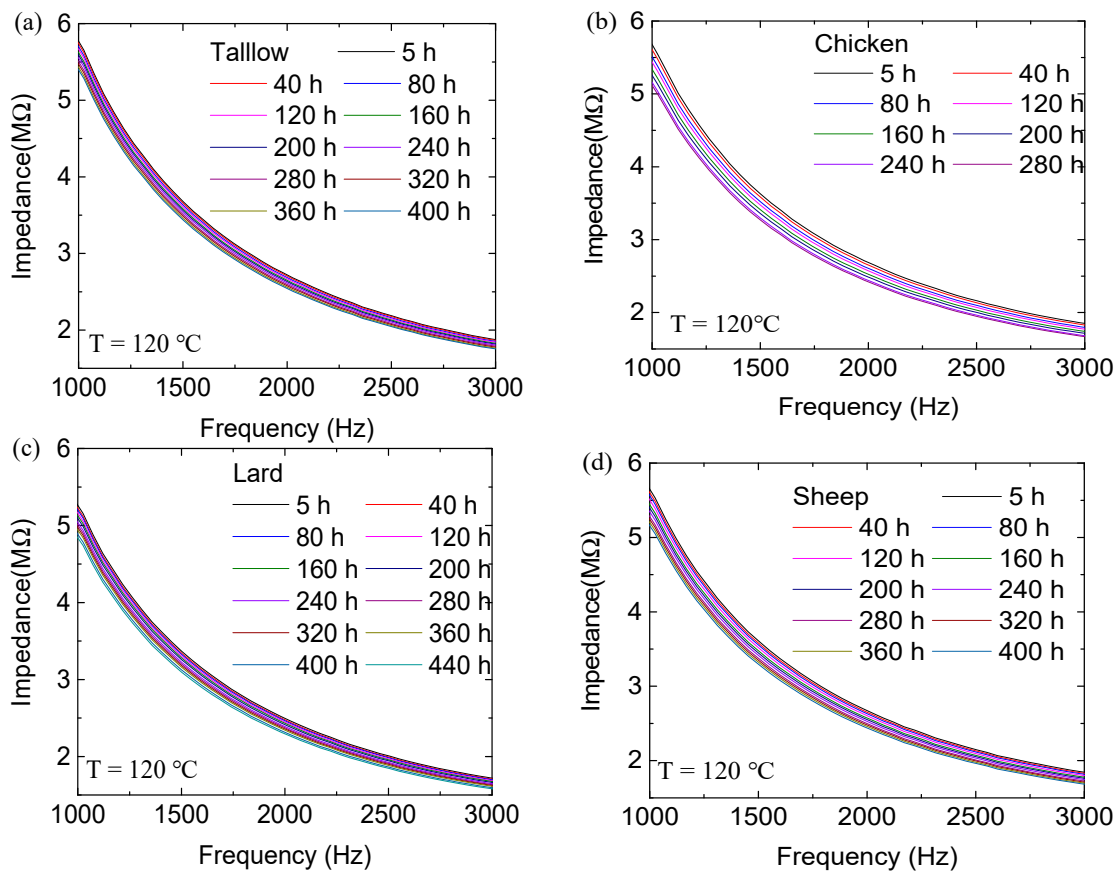


Figure S7. Frequency dependence of electric impedances of the animal oils at 120 °C at different heating times: **(a)** tallow, **(b)** chicken oil, **(c)** lard, and **(d)** sheep oil.

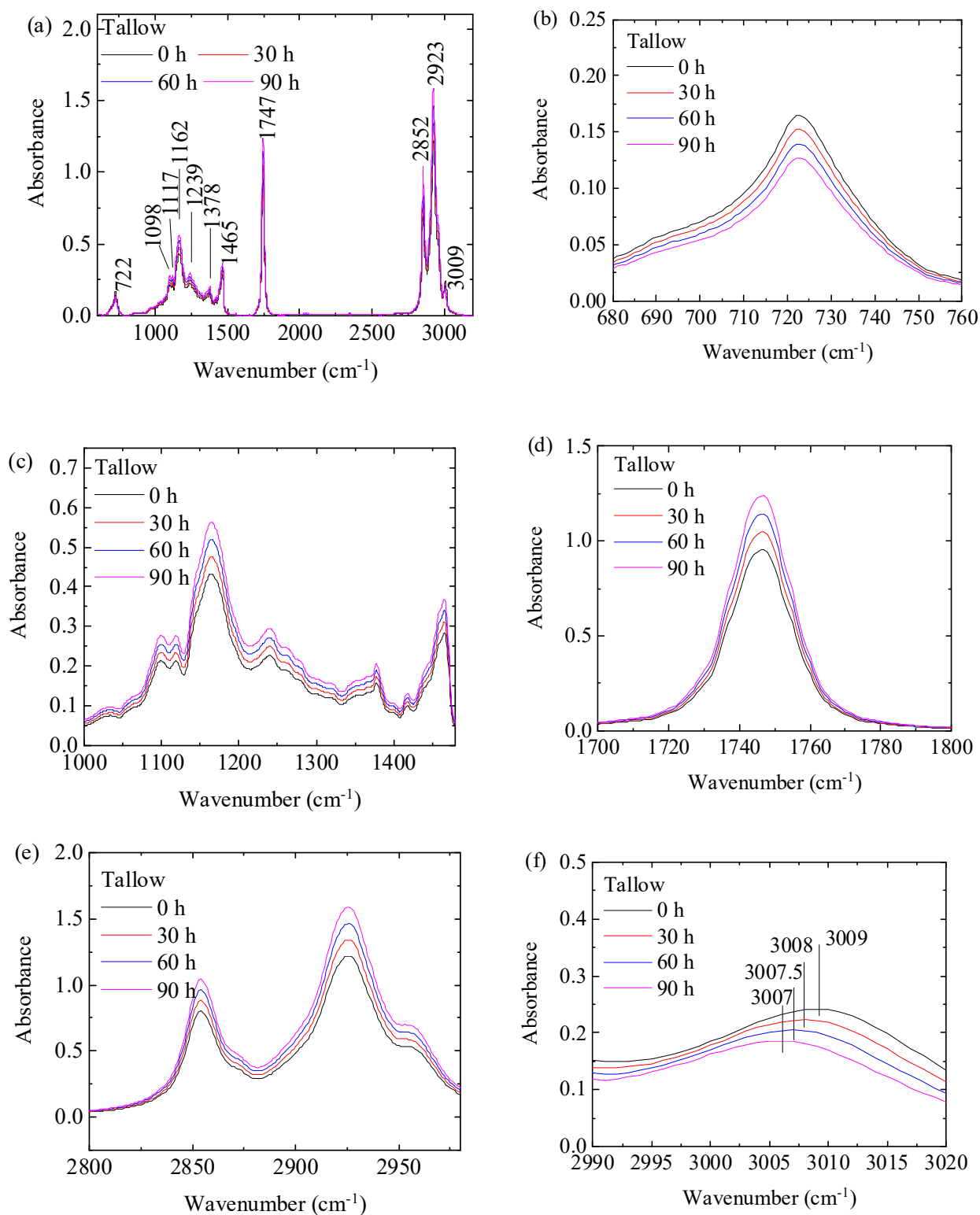


Figure S8. FTIR spectra of tallow with different heating durations at $120\text{ }^{\circ}\text{C}$: (a) overall, (b) 722 cm^{-1} , (c) $1000\text{--}1500\text{ cm}^{-1}$, (d) 1744 cm^{-1} , (e) $2800\text{--}3000\text{ cm}^{-1}$, and (f) 3008 cm^{-1} .

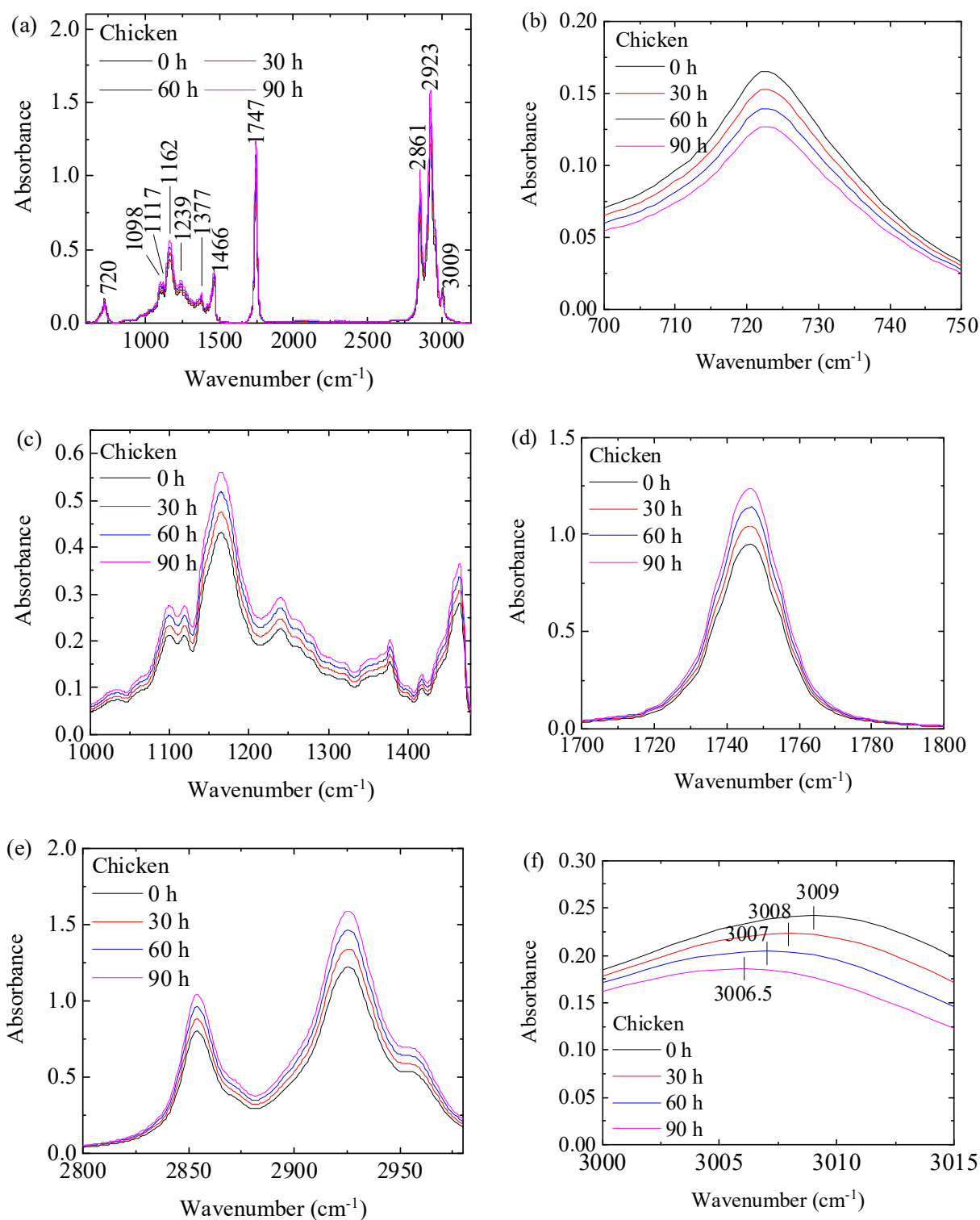


Figure S9. FTIR spectra of chicken oil with different heating durations at 120 °C: (a) overall, (b) 722 cm^{-1} , (c) 1000–1500 cm^{-1} , (d) 1744 cm^{-1} , (e) 2800–3000 cm^{-1} and (f) 3008 cm^{-1} .

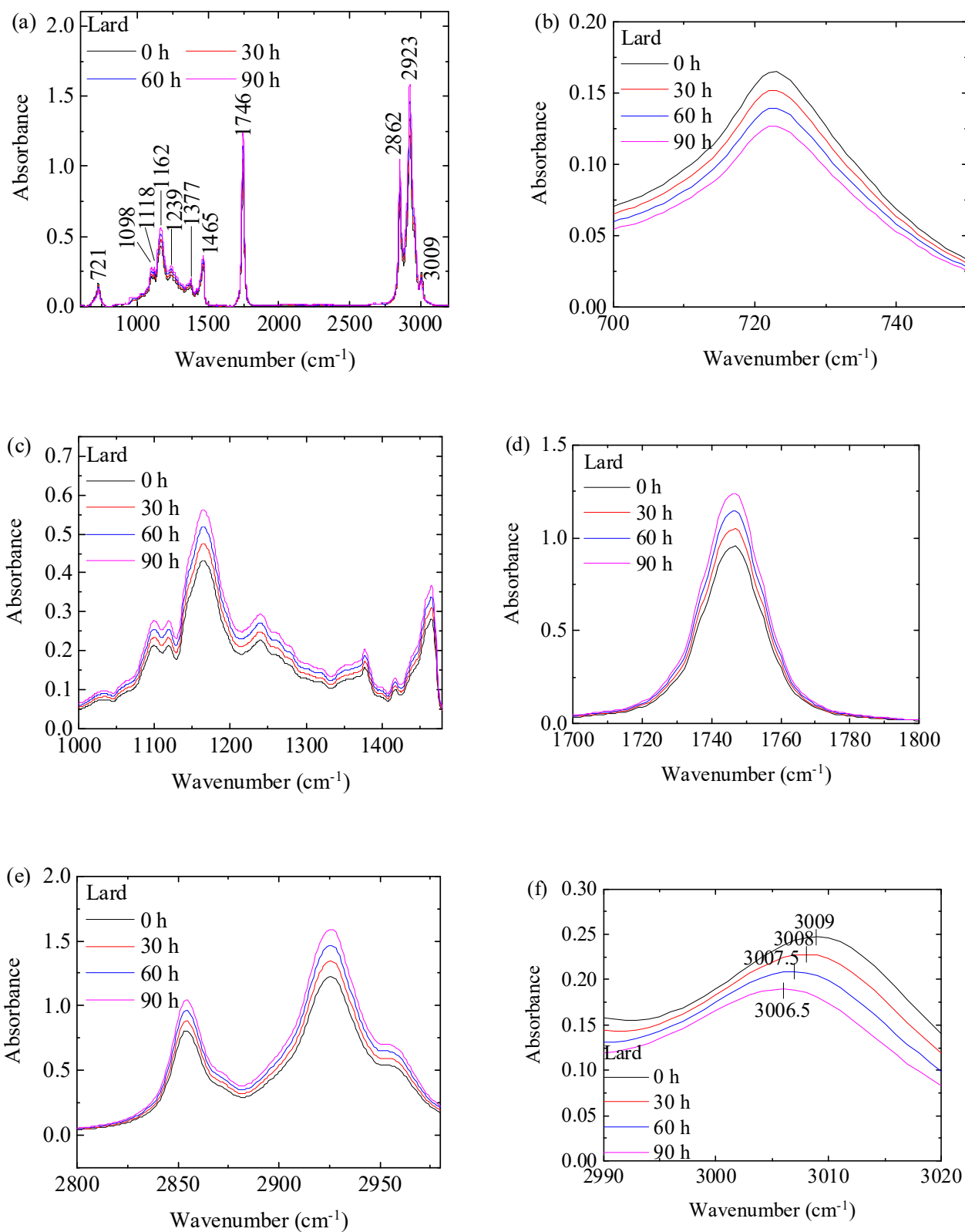


Figure S10. FTIR spectra of lard with different heating durations at 120 °C: (a) overall, (b) 722 cm^{-1} , (c) 1000-1500 cm^{-1} , (d) 1744 cm^{-1} , (e) 2800-3000 cm^{-1} , and (f) 3008 cm^{-1} .

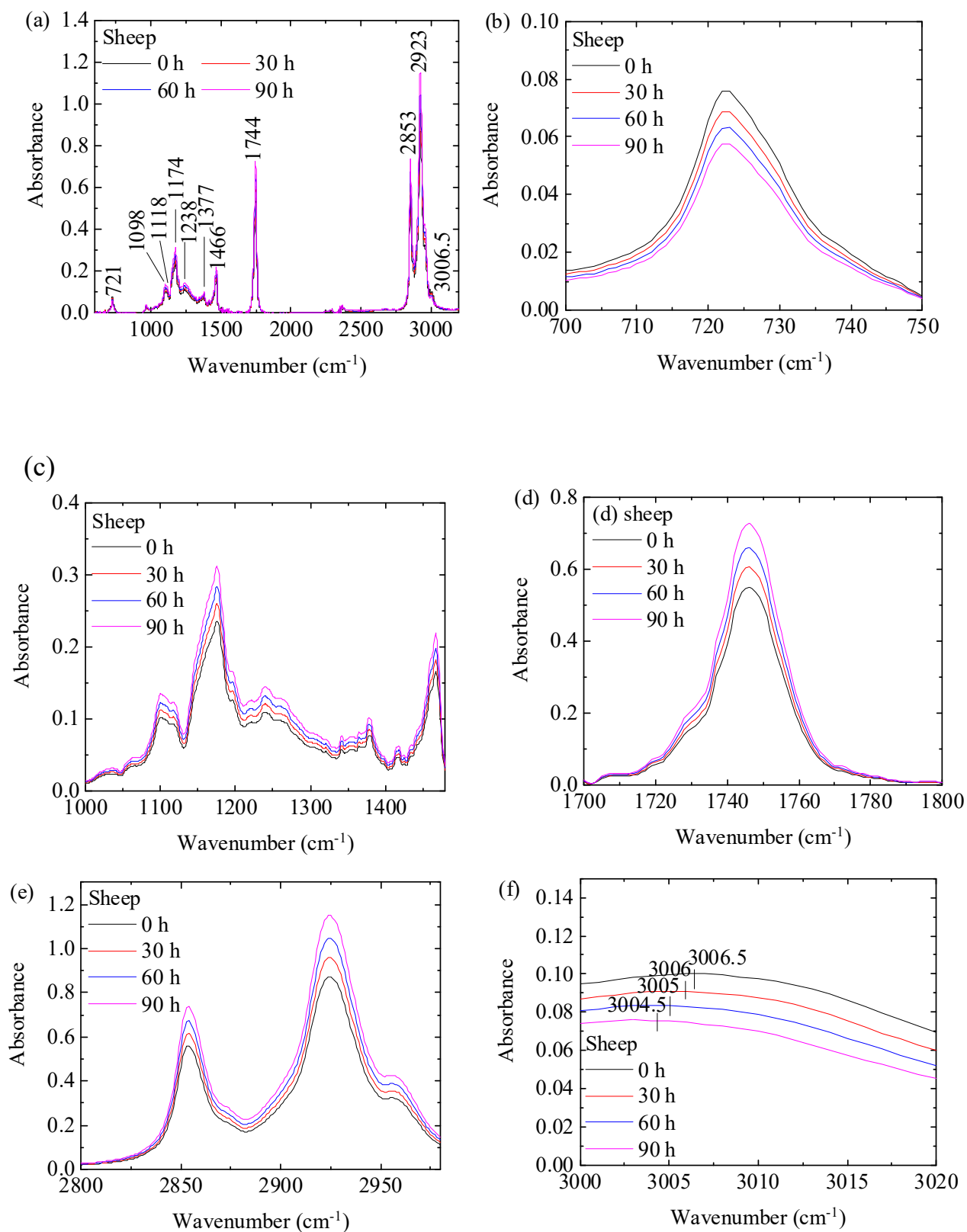


Figure S11. FTIR spectra of sheep oil with different heating durations at 120 °C: (a) overall, (b) 722 cm^{-1} , (c) 1000-1500 cm^{-1} , (d) 1744 cm^{-1} , (e) 2800-3000 cm^{-1} , and (f) 3008 cm^{-1} .

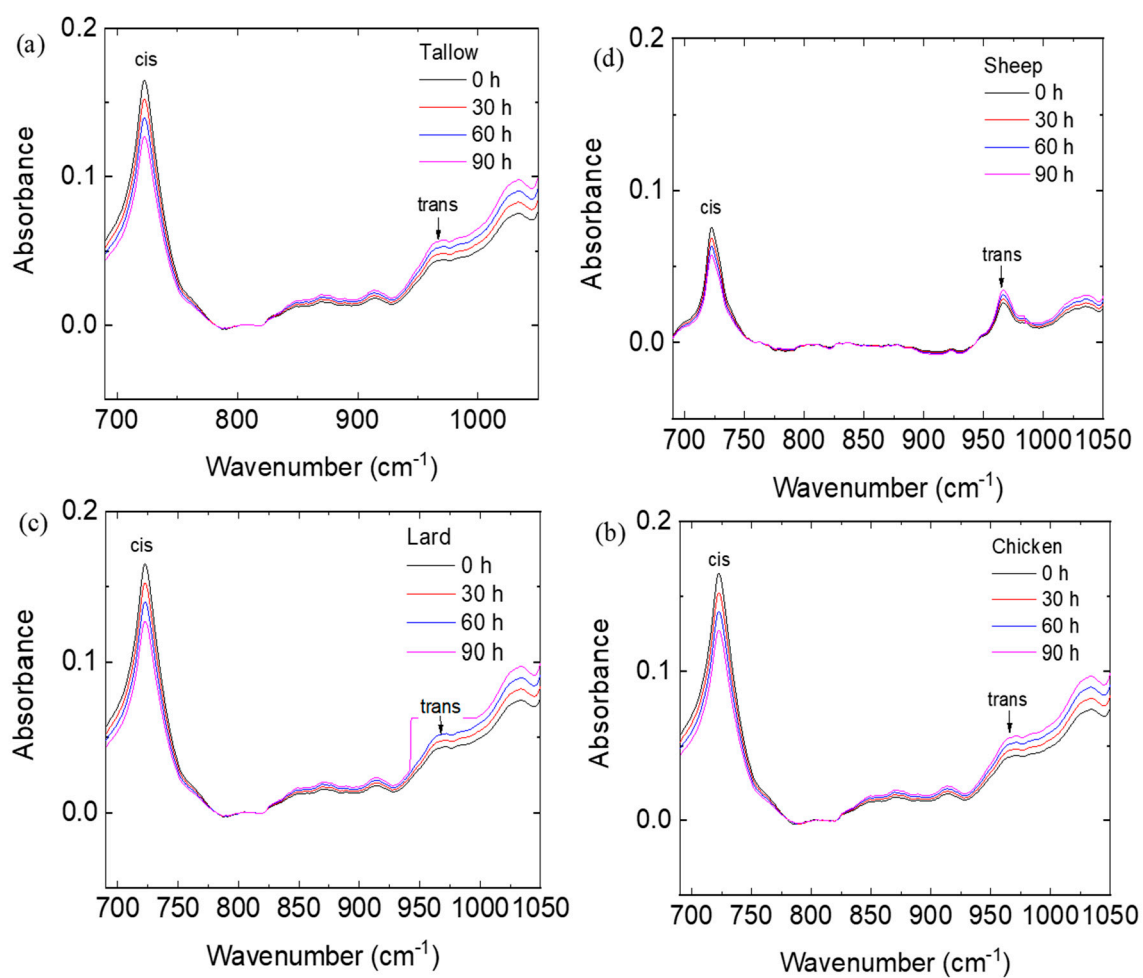


Figure S12. FTIR spectra in the wavenumber range of 690-1050 cm^{-1} of the four animal oils with different heating durations at 120 $^{\circ}\text{C}$.