

# Toasting as a tool to improve the functional properties of fababean protein concentrate

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## Background

- Production of soy protein concentrate (SPC) includes wet fractionation and therefore a drying/heating step
- Fababean protein and starch can be separated with dry fractionation that lacks drying steps/heat treatment
- This results in different functional properties of the protein fraction, which causes them to be more suitable for many applications but less suitable for structuring processes/structured food products.

## Objective

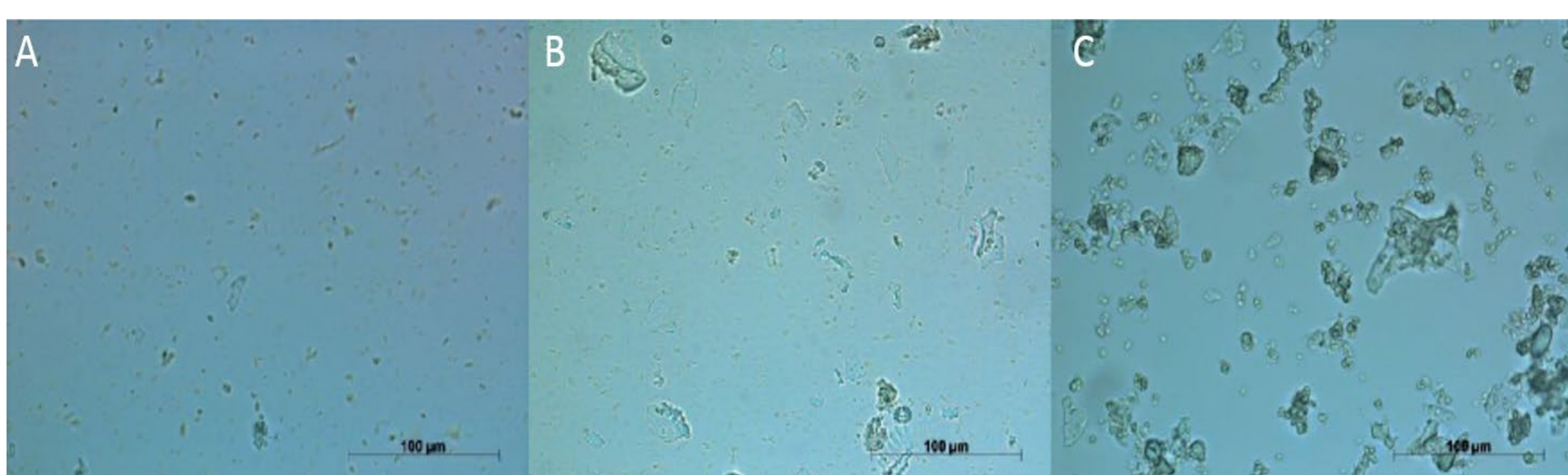
- Compare the functional properties of fababean protein concentrate and soy protein concentrate
- Determine if a dry heat treatment of dry separated fababean protein concentrate (FPC) alters the functional properties

## Results



**Table 1.** Average peak temperature and enthalpy of protein denaturation of toasted and untoasted FPC. Values obtained using the TA Instruments software TRIOS. Toasting at 150°C shifted the peak to a lower temperature and reduced the enthalpy to a third of the value of untoasted FPC.

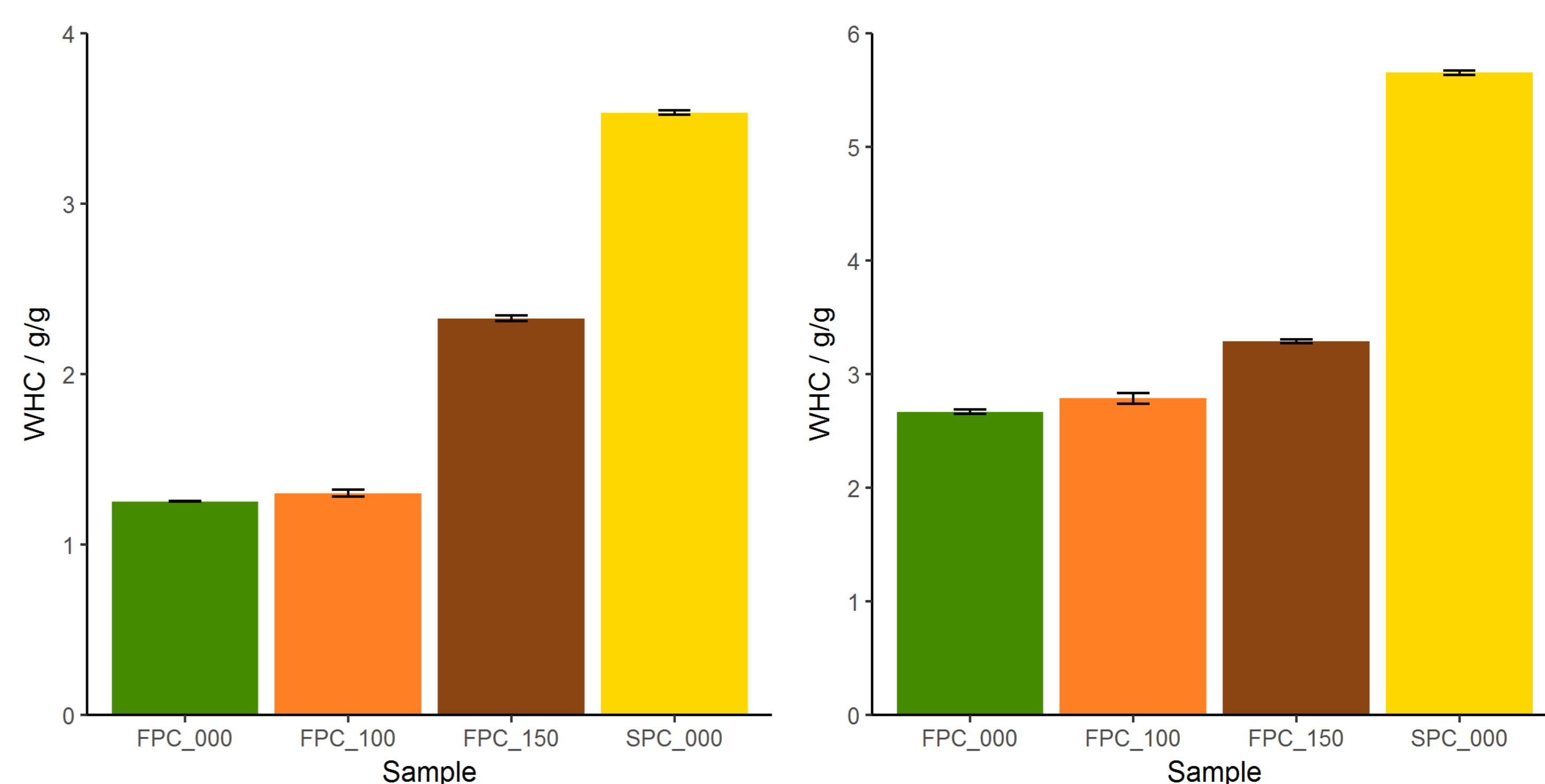
	$T_d / ^\circ\text{C}$	$\pm / ^\circ\text{C}$	$\Delta H / \text{J g}^{-1}$	$\pm / \text{J g}^{-1}$
FPC000	93.18	0.2	0.92	0.05
FPC100	93.62	0.53	0.96	0.03
FPC150	88.8	0.55	0.32	0.08



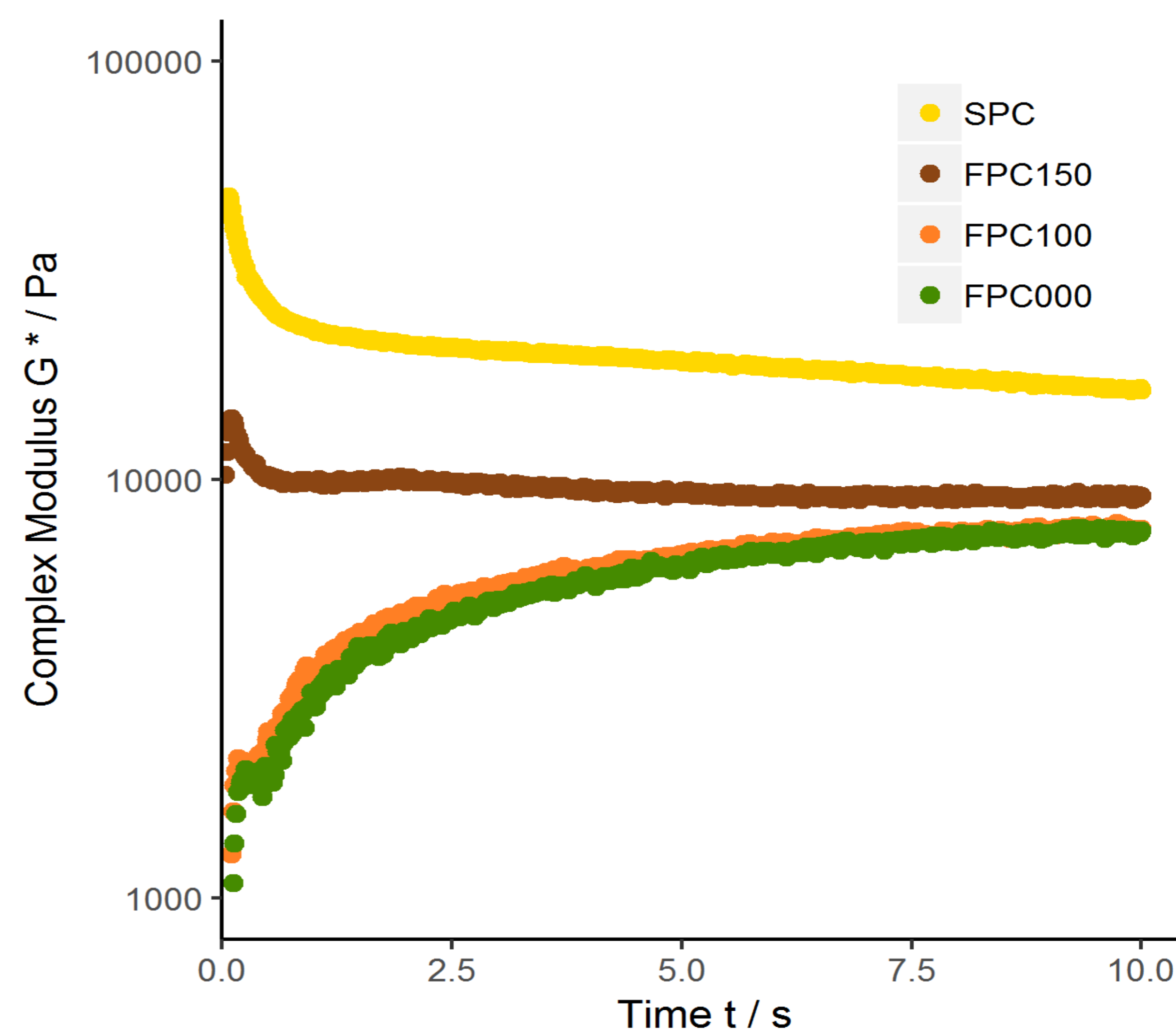
**Figure 1.** Light Microscopy pictures of 2 wt.% dispersions of toasted and untoasted FPC. Samples toasted a 150°C (C) show larger particles than untoasted FPC (A) and FPC toasted at 100°C (B). FPC toasted at 150°C showed large insoluble aggregates that formed after the addition of water.

## Conclusions

- Toasting at 150°C caused partial denaturation and aggregation of protein
- Solubility of FPC decreased after toasting
- Functional properties of FPC were modified towards SPC:
  - WHC increased
  - Initial complex modulus increased



**Figure 2.** Water holding capacity of the overall powder (A) and insoluble fraction (B) of toasted and untoasted FPC as well as commercial SPC. WHC of FPC powder toasted at 100°C did not show any significant difference from untoasted FPC powder. FPC powder toasted at 150°C showed a WHC between untoasted FPC and commercial SPC. The WHC of the insoluble fraction of FPC increased less after toasting at 150°C.



**Figure 3.** Complex Modulus  $G^*$  of toasted and untoasted FPC and commercial SPC doughs (40 wt.% dm) at  $f = 1 \text{ Hz}$ ,  $\gamma = 10 \%$  and  $120^\circ\text{C}$ .  $G^*$  of FPC toasted at 100°C showed a logarithmic growth over time and no difference from untoasted FPC. Toasting at 150°C increased the initial  $G^*$  tenfold, without increase over time, showing the same curve profile as SPC.

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