

Supporting information

Determination of acylation degree

The degree of acylation was evaluated using ninhydrin colorimetry according to the method of Lamothe and McCormick¹. Briefly, one mL each of 1% (w/v) protein samples and 2% (w/v) ninhydrin solutions respectively were mixed and the mixture heated in a boiling water bath for 5 min, followed by rapid cooling to 25 °C. Five mL of distilled water was then added to the cooled mixture and absorbance of the solution measured at a wavelength of 580 nm, with 2% (w/v) ninhydrin solution as the reference solution.

Determination of extent of glycation

The extent of glycation (grafting degree, GD) was measured according to TNBS method described by Adler-Nissen et al. with some modifications². The glycated proteins were dissolved in deionized distilled water at a concentration of 5mg/mL. Then, a volume of 0.25 mL glycated protein was added into 2 mL phosphate buffer (pH 8.2), subsequently, 2 mL TNBS (0.1 %, w/v) was immediately added to the mixture and heated at 50 °C in water bath for 60 min in the dark. After reaction time, 4 mL 0.1M HCl was added to the mixture for terminating the reaction, followed by rapid cooling to room temperature. The absorbance of protein solution was read at 340 nm against a blank treated as above but containing 0.25 mL of water instead of protein (SpectraMax Gemini™^{XS}, Molecular Devices, Inc., USA). The GD was calculated as follows:

$$GD \% = \frac{A_0 - A_t}{A_0} \times 100\% \quad (1)$$

Where A_0 is the amino concentration of ungrafted protein, and A_t is the amino concentration of grafted protein at a grafting duration t h.

Table S 1 Modification degree of rapeseed protein isolates

Samples	Modification	Time (min)	Ratio*(w/w)	Grafting Degree (%)	Acylation degree (%)
RPI1	Acylation	–	1:20	–	38.0±0.2a
RPI2	Acylation	–	2:20	–	47.0±0.4b
RPI3	Acylation	–	3:20	–	56.0±0.3c
RPI4	Glycation	60	1:1	7.0±1.8a	–
RPI5	Glycation	120	1:1	12.0±1.1b	–
RPI6	Glycation	180	1:1	17.0±0.9c	–

* For the acylation, asterisk represents the ratio between butanedioic anhydride and RPI; for the glycation, asterisk represents ratio between dextran and RPI.

^{a-c} Different letters in the same column indicate a statistical difference between the mean values ($p < 0.05$).

References:

1. P. J. Lamothe and P. G. McCormick, *Analytical chemistry*, 1972, **44**, 821-825.
2. J. Adler-Nissen, *Journal of agricultural and food chemistry*, 1979, **27**, 1256-1262.