Supplementary Information

Preparation and characterization of bioplastics made from cottonseed protein

H.-B. Yue[a, b], Y.-D. Cui[a,c]*, P. Shuttleworth[d], James H. Clark[d]*

[a] School of Materials Science and Engineering, Northwestern Polytechnical University, Xi'an, Shaanxi 710072, China

[b] IMDEA Materials Institute, C/Profesor Aranguren s/n, 28040 Madrid, Spain

[c] Green Chemical Engineering Institute, Zhongkai University of Agriculture and Engineering, Guangzhou, Guangdong 510225, China

[d] Green Chemistry Centre of Excellence, Department of Chemistry, University of York, York YO10 5DD, UK

*Correspondence: Y.-D. Cui, James H. Clark.
E-mail address: cuigdut@yahoo.com.cn (Y.D. Cui); james.clark@york.ac.uk (J.H. Clark).

Table S1

Table S1 Plasticization Efficiency (PE) of some animal and plant proteins

	feather keratin	wool	egg white	casein	soy	corn gluten meal	cottonseed
PE	3	2.4	5.8	52	9.9	7.5	5.1-6.6[a]
Reference	[1]	[1]	[1]	[1]	[1]	[1]	[2]

[a] PE value for cottonseed protein was calculated as the ratio of the total amount of serine, threonine and tyrosine to that of cysteine.

Table S2

**Table S2 Average chemical composition of plant oil seeds (% dry weight basis) [3]**

Oil Seeds	Protein	Fat	Starch	Fiber	Ash
Soybean	51-70[a]	18-26	–	6.5	3.7-7.4
Rapeseed	36-44[a]	38-50	–	12-18	7.4-8.8
Sunflowers	20.8	54.8	18.4	2.1	3.4
Peanuts	30	50	14	2.9	3.1
Canola	22	41	22	10	5
Caster bean	12-16	45-50	3-7	23-27	2
Cottonseed [4]	58.8-65.9[b]	–	–	2.6-3.5[c]	7.1-9.3
Copra	4.6-8.0	68-79	17.4-21	4.6-7.7	2.4-3.7
Safflower	21	41	14.5	19	4.5
Linseed	22-26	41.5-45.5	27-31	5.5-9.7	2.7-4.3
Sesame	20	52	23	–	5.6

[a] oil-free basis; [b] after defatting and dehulling operations; [c] crude fiber within cottonseed flour

References

[1] C. Verbeek and L. van den Berg, *Recent Patents on Materials Science*, 2009, 2, 171-189.

[2] C. Marquie and S. Guilbert, in *Protein-Based Films and Coatings*, ed. A. Gennadios, CRC Press, 2002.

[3] R. P. Wool and X. S. Sun, eds., *Bio-Based Polymers and Composites*, Elsevier Science & Technology, Amsterdam, 2005.

[4] W. H. Martinez, L. C. Berardi and L. A. Goldblatt, *J Agr Food Chem*, 1970, 18, 961-968.

Fig. S1
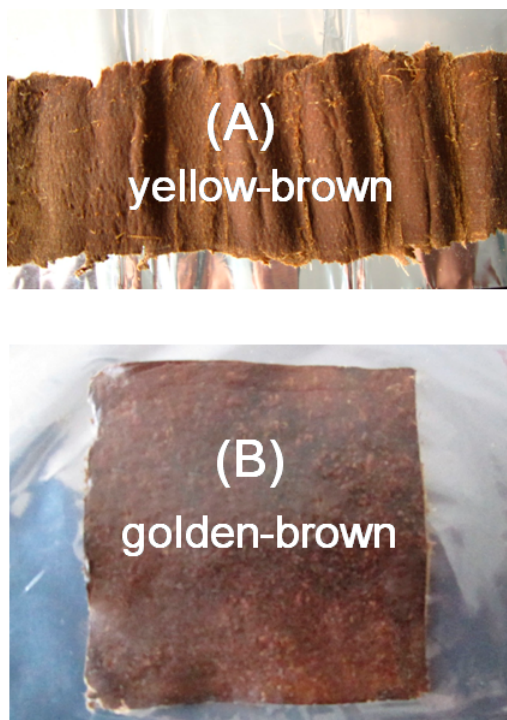
Fig. S1 Photographs of the CPBs before (A) and after (B) the hot-press molding.

Fig. S2
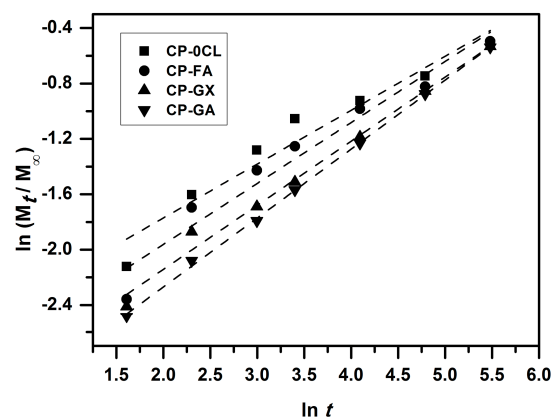
Fig. S2 The fitting plot of $\ln(M_t/M_\infty)$ vs. $\ln t$ according to Fickian diffusion at a condition of $0 \leq (M_t/M_\infty) \leq 0.6$.