Fibrillization of plant proteins

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Shear – induced structuring of highly concentrated plant materials

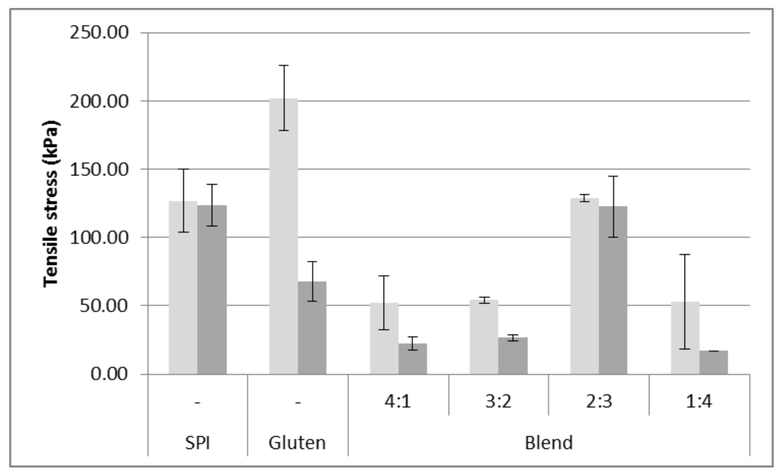
The concept of shear-induced structuring was applied to concentrated (20-45%) blends of soy and gluten proteins.
The ratio of the soy to gluten protein and the total dry matter content in a blend determined the morphology of the structure formed upon shearing and heating (15 s^{1}, 95°C).

dry matter content	structure					
45%	*	*	-	-	-	-
40%	*	*	**	fibers and layers		
35%	**	**				
30%	isotropic gel	gel with fibers				fibers
25%						***
20%						
soy : gluten ratio	5 to 0	4 to 1	3 to 2	2 to 3	1 to 4	0 to 5

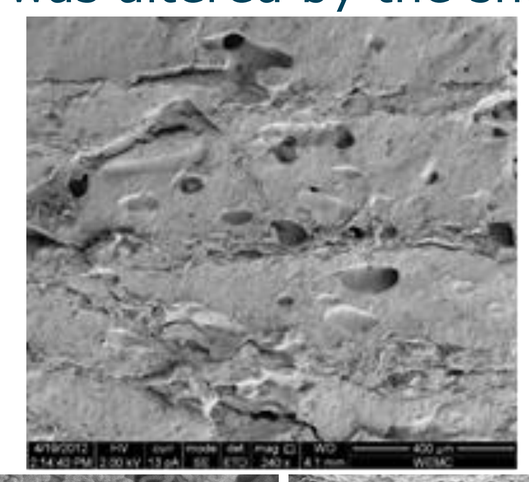
* protein blend too dry to be structured; ** broken gel; *** free water.

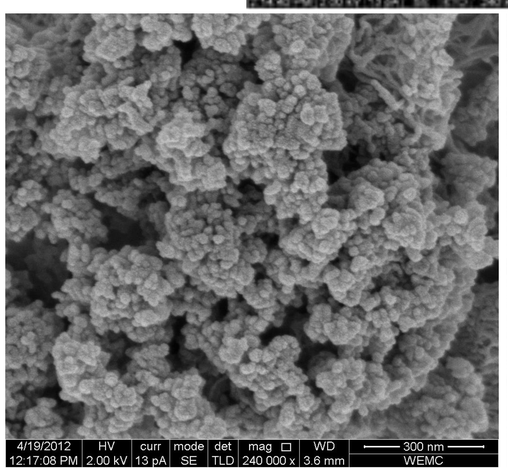
A random commercial soy protein isolate was not able to form a highly pronounced anisotropic material like fibers contrary to vital gluten which underwent fibrillization.

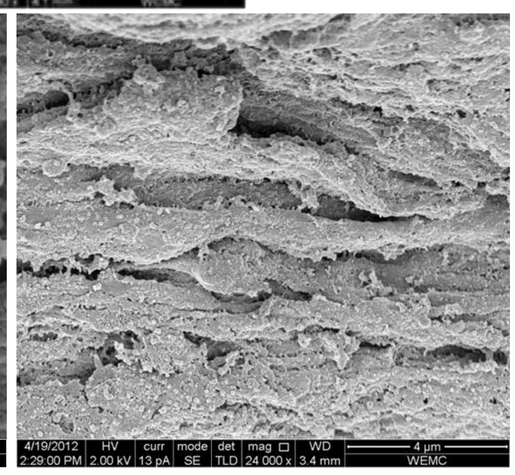
A pre-requisites to produce aligned hierarchical structure was simultaneous heating and shearing in a presence of gluten. The anisotropy of structures obtained was confirmed with a tensile test.



The micro-phase separation led to formation of phases with a locally increased concentration of one protein while depleted the other. Upon processing, a spatial distribution of both phases (soy-rich and gluten-rich) was altered by the shear flow.







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