

## **STRUCTURE AND PROPERTIES OF WHEAT GLUTEN/CHITOSAN BLENDS**

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### **ABSTRACT**

This is, to our knowledge, the first study on the structure of blends of wheat gluten and chitosan. The structure was analyzed with optical and scanning electron microscopy and the properties were evaluated using UV/VIS spectroscopy, tensile testing and moisture sorption. In the interval examined, 30-70 wt.% wheat gluten, it was observed that wheat gluten was the discontinuous phase. In the water/ethanol system large glutenin particles were observed in the films, surrounded by a continuous chitosan matrix containing very small (average particle size: 0.7-1  $\mu\text{m}$ ) gliadin particles. The number of large glutenin particles was reduced significantly or were even absent when reducing agents were used. A unique morphology of elongated wheat gluten particles was observed when a crosslinking agent (glyoxal) was used in combination with sodium sulfite (reducing agent). The transparency was also greatest for this sample due to the very thin particles (0.6  $\mu\text{m}$ ). The use of surfactants alone or in combination with the reducing agents did not reduce the wheat gluten particle sizes, in fact the use of surfactants led to larger particles. The use of urea (plasticizer/denaturing agent), glycerol (plasticizer) or ultrasonication, did not alter the blend structure significantly. The tensile properties of the blends where wheat gluten had been treated with sodium sulfite showed that the stiffness increased in the presence of wheat gluten. On the other hand, the extensibility and toughness decreased with increasing wheat gluten content. The moisture uptake decreased with increasing wheat gluten content and the moisture diffusivity was lower for the blends, and for wheat gluten, as compared to that of chitosan.