PHYSICAL AND STRUCTURAL PROPERTIES OF WHEY PROTEIN CONCENTRATE BASED NANOCOMPOSITE FILMS REINFORCED WITH TIO_2 NANOPARTICLES FOR EDIBLE FOOD-PACKAGING

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The interest for polymer technology based on biodegradable and edible films has undergone an extraordinary increase, in view of a circular economy with low or no environmental impact. In particular, food packaging plays a significant role in the production of plastics and waste, but highly advanced and interdisciplinary technologies are continuously developing to afford this problem and to provide workable solutions **[1, 2]**.

Nanocomposite films based on whey protein concentrate powders were prepared and characterized as a function of protein concentration, nano-TiO_2 loading, and size scaling of the fat component, demonstrating at the same time the possibility for reusing food waste, engineering new functional materials with controlled physical and chemical properties, improving food security. Advanced X-ray microscopy based on small and wide angle scattering contrast is used to investigate the nanocomponents in the films, allowing the identification of the main scattering species through a specifically tailored titration-like approach. Nanoemulsion-based films showed better mechanical properties and less pores or cracks than films with micro droplets. This improved behavior is related to the homogeneity of structure at nano- and micro- scales.

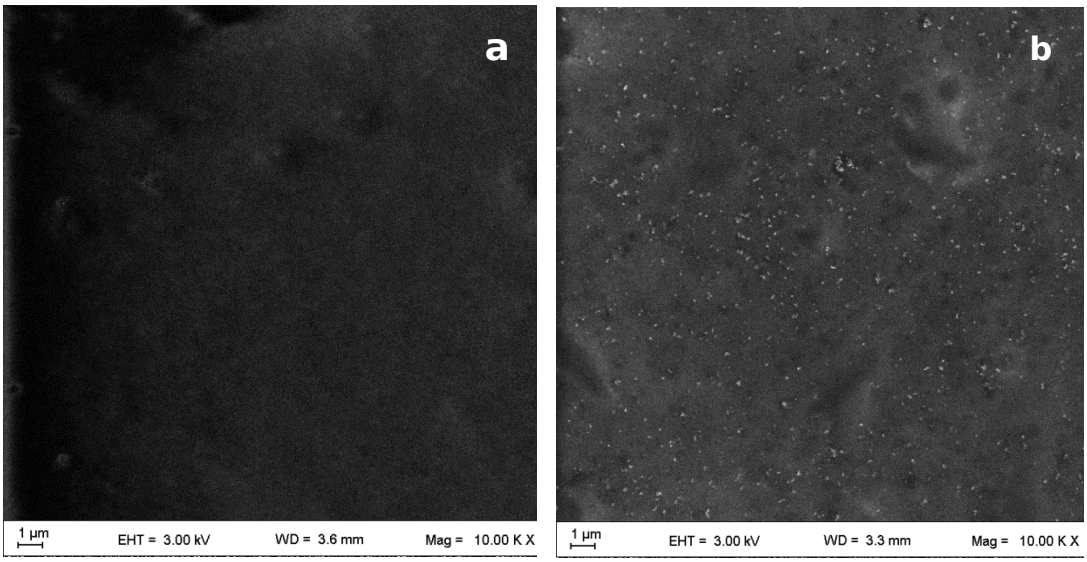

Figure 1: SEM images of films without (a) and with (b) TiO_2

Palabras clave: Nanocomposite films; Structure; X-ray microscopy.

[1] E. Jaheda, M.A. Khaledabad, et al., Carbohydrate Polymers, 164 (2017) 325–338.
[2] J.M. Montes de Oca-Ávalos, D. Altamura, et al., Food Res. Int., 105 (2018) 129–139.