Contribution ID: **218** Type: **Poster**

Synthesis of Crosslinking Films Based of 3-(Trimethoxysilyl) Propyl Methacrylate Silanized Xantham Gum/Lignin and their Crosslinking by Gamma Radiation, to Potential Application and Films Packing

Thursday, 27 April 2017 14:15 (2 hours)

The production of biodegradable and edible films based on biopolymers has attracted attention and represents one of the most advanced challenges in the field of food packaging and coating. Polymers derived from natural products offer the greatest opportunities as component of edible films since their biodegradability and environmental friendly [1]. Xanthan gum has been used in a wide variety of foods (in many low fat food systems due to its water binding capacity) for a number of important reasons, including emulsion stabilization, temperature stability, compatibility with food ingredients and its pseudoplastic rheological properties [2]. Xanthan gum is classified E 415 in the European List of Permitted Food Additives. According to JECFA (Joint WHO/FAO Expert Committee on Food Additives), it has the status of ADI-nonspecified (Acceptable Daily Intake), i.e., no quantitative limitation is stated, and, as such xanthan gum is recognized as a non-toxic additive for human consumption. Lignin, a natural biopolymer, mostly derived from wood, is an enormous and renewable reservoir of latent polymeric materials and aromatic chemicals. Due to their very complex structure, lignins are amorphous polymers with rather limited industrial use. They are usually seen as waste products of pulp and paper industry and often used as fuel for the energy balance of the pulping process [3]. Unfortunately, the use of biopolymers as food packaging materials has drawbacks such as poorer mechanical, thermal, and barrier properties as compared to the conventional non-biodegradable materials made from petroleum. The incorporation of nanofillers such as silicate, clay, and titanium dioxide (TiO2) to biopolymers may improve not only the biopolymers'mechanical and barrier properties but also offer other functions and applications in food packaging such as antimicrobial agent, biosensor, and o xygen scavenger [4].
In this work, the xanthan gum/lignin mixture was silanized with 3-(trimethoxysilyl) propyl methacrylate, and consequently crosslinking by gamma radiation. The best conditions to prepared hybrid biofilms were 95/5 ratio of xanthan gum/lignin, 5 % wt. of organosilane at 20 kGy at 5 kGy h-1 of dose and dose rate respectively. By FTIR-ATR and NMR spectroscopy was possible confirm the silanized reaction. The morphological aspect and size dimension were determined by SEM and TEM. The thermal behavior was analyzed by DSC and TGA.

References:

1. N. Akdeniz, S. Sahin, G. Sumnu. Journal of Food Engineering 75 (2006), 522–526.
2. F. Jiangyang, W. Kang, L. Meimei, H. Zhimin. Carbohydrate Polymers 73 (2008), 241–247.
3. J.K. Saini, R. Saini, L. Tewari. 3 Biotech 5 (2015), 337–353.
4. J.W. Rhim. Carbohydrate Polymers 86 (2011), 691-699.

Country/Organization invited to participate

Mexico

Primary author: Ms GARCIA-URIOSTEGUI, Lorena (Departamento de Madera Celulosa y Papel-Universidad de Guadalajara, carretera Guadalajara-Nogales Km. 15.5, Zapopan, Jalisco 45110, Mexico.)

Co-authors: Ms ORTEGA, Alejandra (Instituto de Ciencias Nucleares, Universidad Nacional Autónoma de México, Mexico); Ms DELGADO, Ezequiel (Departamento de Madera Celulosa y Papel-Universidad de Guadalajara, carretera Guadalajara-Nogales Km. 15.5, Zapopan, Jalisco 45110, Mexico.)

Presenter: Ms GARCIA-URIOSTEGUI, Lorena (Departamento de Madera Celulosa y Papel-Universidad de Guadalajara, carretera Guadalajara-Nogales Km. 15.5, Zapopan, Jalisco 45110, Mexico.)

Session Classification: P-A2

Track Classification: RADIATION SYNTHESIS AND MODIFICATION OF MATERIALS