SYNTHESIS AND CHARACTERIZATION OF POLY(ACRYLIC ACID) - BASED COMPOSITES CONTAINING MICROALGAE BIOPOLYMERS: FOR BIOMEDICAL AND ENVIRONMENTAL APPLICATIONS

M. Olvera-Sosa[1,3], A. Guerra-Contreras[1,3], S. Rosales-Mendoza[2, 3], G. Palestino[1,3]

[1]Laboratorio de BiopolÃmeros y Nanoestructuras, Facultad de Ciencias QuÃmicas, Universidad AutÃ³noma de San Luis PotosÃ, Av. Manuel Nava No. 6, San Luis PotosÃ, San Luis PotosÃ, 78210, MÃ‰XICO,Â [2] Laboratorio de BiofarmacÃ©uticos Recombinantes, Facultad de Ciencias QuÃmicas, Universidad AutÃ³noma de San Luis PotosÃ, Avenida Dr. Manuel Nava 6, San Luis PotosÃ, 78210, MÃ‰XICO,Â [3] SecciÃ³n de BiotecnologÃa, Centro de InvestigaciÃ³n en Ciencias de la Salud y Biomedicina, Universidad AutÃ³noma de San Luis PotosÃ, Avenida Sierra Leona 550, Lomas Segunda SecciÃ³n, San Luis PotosÃ, 78210, MÃ‰XICO

Organic materials are attractive for the production of polymers due to cost, environmental aspects and low toxicity [1]. Several studies on the use of organic materials, such as pectins [2], microalgae [3] and carrageenans [4], functionalized with synthetic polymers point out as a promising alternative to generate hydrogels useful in waste water treatment [2,3], biomedical applications [1,4,5], agriculture [6], among other fields. In this context, the present study was focused on the synthesis and determination of the physicochemical, thermal and mechanical properties of a polymeric acrylic acid composite containing polymers from the cell wall of the *Schizochytrium* sp. (SCZ) microalgae; with the objective of obtaining a naturally crosslinked copolymer that could serve as elastomer or hydrogel depending on biopolymer concentration. Dynamic light scattering (DLS), Fourier transform infrared spectroscopy (FTIR) and nuclear magnetic resonance (^{13}C NMR) analyses were conducted to characterize the copolymer. In a first stage, the copolymer properties such as swelling capacity, tensile stability and thermal stability (DSC) were studied. A second stage consisted of an estimation of water loss capacity with respect to temperature by TGA to compare the copolymer with commercial hydrogels used in agriculture. In addition, the cytotoxicity of the copolymer was studied, which is critical to define its potential to be used as vehicle for drug release.

Keywords: biopolymer, crosslinking, microalgae

References:

1. Puoci, F. (2015).Â Advanced polymers in medicine. Springer.
2. K. Chauhan, R. Kumar, M. Kumar, P. Sharma, G.S. Chauhan, Modified pectin-based polymers as green antiscalants for calcium sulfate scale inhibition, Desalination. 305 (2012) 31â€“37. doi:10.1016/j.desal.2012.07.042
3. K. Chauhan, P. Patiyal, G.S. Chauhan, P. Sharma, Star-shaped polymers of bio-inspired algae core and poly(acrylamide) and poly(acrylic acid) as arms in dissolution of silica/silicate, Water Res. 56 (2014) 225â€“233. doi:10.1016/j.watres.2014.03.009.
4. H. Hosseinzadeh, A. Pourjavadi, G.R. Mahdavinia, M.J. Zohuriaan-Mehr, Modified Carrageenan. 1. H-CarragPAM, a Novel Biopolymer-Based Superabsorbent Hydrogel, J. Bioact. Compat. Polym. . 20 (2005) 475â€“490. doi:10.1177/0883911505055164.
5. Y. Qiu, K. Park, Environment-sensitive hydrogels for drug delivery, Adv. Drug Deliv. Rev. 64 (2012) 49â€“60. doi:10.1016/j.addr.2012.09.024.
6. Demitri, C., Scalera, F., Madaghiele, M., Sannino, A., & Maffezzoli, A. (2013). Potential of cellulose-based superabsorbent hydrogels as water reservoir in agriculture.Â International Journal of Polymer Science,Â 2013.

Presenting author's email: miguel_olvera@outlook.com