

A study of the relationship between the morphology and swelling degree of hydrogels composite from polysaccharide and MMT.

Marcia P. M. Costa¹ (PG), Ivana L. M. Ferreira^{1*} (PQ)

¹Instituto de Química, Universidade do Estado do Rio de Janeiro

Instituto de Química, Universidade do Estado do Rio de Janeiro, Rua São Francisco Xavier, 524, PHLC, sala 310, Maracanã, Rio de Janeiro, RJ, 20550-900.

*ivanamello@uerj.br

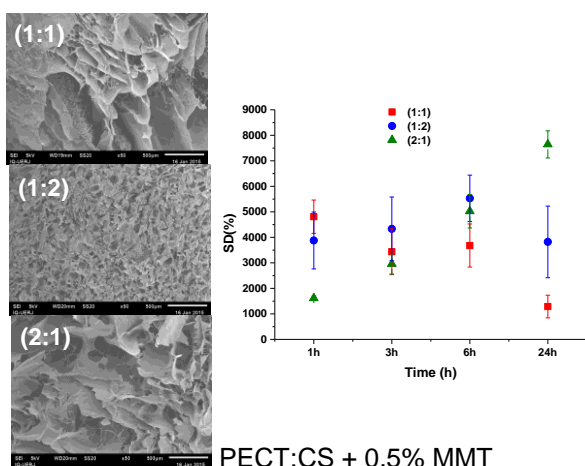
Keywords: pectin, chitosan, clay, crosslinking, morphology, swelling degree.

Introduction

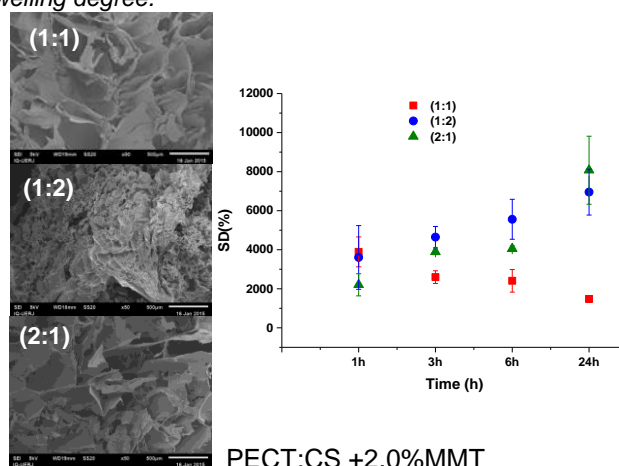
Hydrogels consist of one or more three-dimensional polymeric network formed by interconnected macromolecular chains^(1,2). Natural polymers have been an attractive for countless researchers as much for its easily available in nature. In this work, hydrogels were produced from the combination of two polysaccharides; pectin, a polyanionic (-CO₂⁻) complex, non-toxic biopolymer and chitosan, a polycationic (-NH₃⁺), crystalline polysaccharide, produced commercially by deacetylation of chitin. This combination was done in order to form an IPN with and without added clay (Cloisite 10A)^(3,4). The compositions were prepared in concentration from 3.0% w/w to pectin, 1.5% w/w to chitosan and clay was varied at 0.5 and 2.0% in a volumetric ratio of polysaccharide (PECT / CS = 1/1; 1/2 and 2/1). The crosslinking time was kept constant at 24 h and after that lyophilized. The samples were characterized by SEM, and degree of swelling in water. Significant influences were observed in the absorption of water and morphology. The hydrogel with higher content of MMT provided a higher swelling.

Results and Discussion

The Figure 1 shows the swelling profile and the morphology of samples produced.



PECT:CS + 0.5% MMT



PECT:CS + 2.0% MMT

Figure 1. SEM micrographs and swelling curves of samples

Hydrogels prepared with a higher concentration of pectin (2:1) showed a higher degree of swelling. In the presence of 2.0% clay, the swelling degree presented a significant increase, probably due to the hydrophilic nature of the clay. The micrographs corroborates this result due to the presence of pores in hydrogels.

Conclusions

Hydrogels prepared with the addition of 2.0% clay had a tendency to increase the degree of swelling. The morphology analysis showing the type of pores in each sample was important to understanding of swelling degree for each composition.

Acknowledgements

The authors thank the Fundação Carlos Chagas Filho Research of the State of Rio de Janeiro (FAPERJ) for financial support

¹Alvarez-Lorenzo, C.; Blanco-Fernandez, B.; Puga, A. M.; Concheiro, A. *Adv. Drug Delivery Reviews*, **2013**, 65, 1148.

²Baysal, K.; Aroguz, A. Z.; Adiguzel, Z.; Baysal, B. M., *Intern. J. Biol. Macrom.*, **2013**, 59, 342.

³Haraguchi, K.; Takehisa, T. *Adv. Mater.*, **2002**, 14, 1120.

⁴Lee, K. Y.; Mooney, D. J. *Prog. in Polym. Sci.*, **2012**, 37, 106.