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Porous Nanocomposites of Natural Rubber and Bacterial Cellulose

Eliane Trovatti [(1)*], Antonio José Félix Carvalho [(1)], Alessandro Gandini [(1)]

(1) Departamento de Engenharia de Materiais, Universidade de São Paulo, USP, São Carlos, SP, Brazil

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Abstract

Natural Rubber (NR) is a natural polymer endowed with unique properties such as high elasticity, high film forming capacity and high hydrophobicity. Due to its elastic character, it is a potential biomaterial for use in replacement of elastic tissues in living organisms, however, some of their properties, mainly tensile strength, should be improved. Bacterial Cellulose is a special kind of nanocellulose produced by bacteria with a large number of applications in biomedical field. The high tensile strength, low density, biocompatibility anf long fiber length of BC allows it to be used as a reinforcing element to NR matrix. In this work, aqueous latex of NR and Bacterial Cellulose were physically associated in order to attain nanostructured bionanocomposites with improved properties. The porous nanostructure was attained by addition of NaCl solution to the suspension of NRBC, which were oven dried, washed with distilled water and freeze dried. The bionanocomposites were characterized by Scanning Electron Microscopy, water contact angle measurements and mechanical tests. The results show a good reinforcement of the NR matrix and a high number of pores homogenously distributed into the matrix. The improvement of mechanical behavior of the composites was a result of the incorporation of BC into the NR matrix. The amount and size of the pores were defined by salt (NaCl) concentration. The novel nanostructured composite could find applications in fields such as in cartilage replacement and as an alternative to substrate for cell culture.