

Comparison of Physical, Chemical, and Thermal Properties of Chitin Nanofibers Extracted from Different Species of Crab Shells; Blood Spotted, Blue Swimmer, Mud, and Scylla

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Chitin nanofibers are emerging as an attractive bio-compatible material in a wide range of applications, including biomedical applications, pharmaceutical material development, cosmetics, etc. Recently, interest in the use of chitin as a source of nanostructured materials is increasing. Chitin is an interesting polysaccharide from a chemical point of view due to the presence of a number of relatively active functional moieties. In this study, the main focus was to examine the potential use of chitin nanofibers in dermal application to impart the immediate improvement of skin rigidity using a readily available source. Hence, selected four different species of crab shells namely; Blood Spotted (BSP), Blue Swimmer (BSW), Mud, and Scylla were subjected to alkali extraction followed by ultrasonication to obtain chitin nanofibers. The extracted nanofibers were subjected to characterization for their physical, chemical, and thermal properties and were used to compare the said properties against the crab species in order to select the best-suited species. Atomic force microscopy was used to measure the aspect ratio of chitin nanofibers and found to be 32:1, 27:1, 21:1, and 16:1 for nanofibers extracted by BSP, BSW, Mud, and Scylla crab shells, respectively. Based on the FTIR analysis data, the degree of N-acetylation of chitin nanofibers extracted from Mud, BSP, BSW, and Scylla crab shells was calculated and it was 65%, 60%, 43%, and 52%, respectively. According to the Thermogravimetric Analysis data, the nanofibers extracted from BSP, BSW, and Mud crab shells exhibited relatively high thermal stability. Based on the data obtained for the chitin nanofibers extracted from different species, the highest aspect ratio and thermal stability were shown by chitin nanofiber extracted by BSP crab shells with a comparatively high degree of acetylation. The results suggest that BSP crab shells can be selected as the best source of extracting chitin nanofibers for achieving the formulation to be used as the dermal application.

Keywords: Chitin Nanofiber, Crab Shells, Dermal Application, Chitin Extraction