

OPTIMIZATION OF MECHANICAL PROPERTIES AND BIOACTIVITY OF COMPOSITE MATRICES BASED ON CHITOSAN AND NANOFIBRILL CHITIN FOR THE TISSUE ENGINEERING

N. V. Smirnova^{a, b, *}, K. A. Kolbe^b, E. N. Dresvyanina^{a, c}, I. P. Dobrovolskaya^{a, b}, and V. E. Yudin^{a, b}

^a*Institute of Macromolecular Compounds, Russian Academy of Sciences, St. Petersburg, 199004 Russia*

^b*Peter the Great St. Petersburg Polytechnic University, St. Petersburg, 195251 Russia*

^c*S. Petersburg State University of Industrial Technologies and Design, St. Petersburg, 191186 Russia*

**e-mail: nvsmirnoff@yandex.ru*

The paper discusses the mechanical properties of film matrices based on chitosan, as well as the possibility of optimizing these properties by adding chitin nanofibrils. It is shown that with the addition of a filler, the composite material acquires the stability of mechanical properties. By varying the concentration of chitin nanofibrils, it is possible to obtain a spectrum of samples with different bioactive properties in relation to the culture of human dermal fibroblasts. Film nanocomposite matrices based on chitosan and 5 wt. % chitin nanofibrils have an optimal balance of mechanical properties and bioactivity with respect to the culture of human dermal fibroblasts.

Keywords: biomaterial, nanocomposite, chitosan, chitin nanofibrils, dermal fibroblasts, tissue engineerings