# NEW COMPOSITES BASED ON BACTERIAL NANOCELLULOSE AND GELATIN

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## Introduction

Gelatin is a biopolymer which derives from collagen. Gelatin itself is widely applied in the food industry and for preparation of biomedical and cosmetic materials.
Bacterial nanocellulose (BNC), also defined as microbial cellulose, is produced by bacteria. The valuable properties of BNC include, in particular, unique biological, physicochemical and mechanical properties. An example of exceptional properties are high crystallinity, high water-holding capacity, excellent tensile strength and also Young's modulus. BC is used in medicine as wound dressings, drug carriers, medical implants and in cosmetology. It also has a significant role in various industries, i.e. food, paper, textile, chemical industries. Gelatin and BNC have been widely used for production of 3D sponges, wound dressings and scaffolds for biomedical applications [1]. The blends of these biopolymers with other compounds are also widely used in cosmetic preparations [2]. Binary blends and composites of two natural polymers can lead to preparation of new materials suitable for biomedical applications [1,3]. In this work, the composites based on bacterial nanocellulose and gelatin were prepared and its properties were studied.

## Materials and Methods

Bacterial nanocellulose was obtained from the Center of Polymer System Tomas Bata University in Zlin, Czech Republic. Gelatin was purchased by Sigma-Aldrich company.
Bacterial nanocellulose was blended with gelatin and the composite was obtained. The structure of the composites was evaluated by attenuated total reflection infrared spectroscopy and Scanning Electron Microscope (SEM) pictures. Surface properties of thin films were analyzed by AFM and contact angle measurements. Swelling properties were also studied. Preliminary biological test has been done.

## Results and Discussion

Blending of BNC and gelatine led to the porous composite. IR spectroscopy showed that between components of the composite there are interactions, mainly due to hydrogen bond. Example of FTIR spectrum is shown in FIG. 1. According the structure of single biopolymers the interactions are due to hydrogen bonds formed between chemical moieties of polymers. SEM image of the composite is shown in FIG. 2.

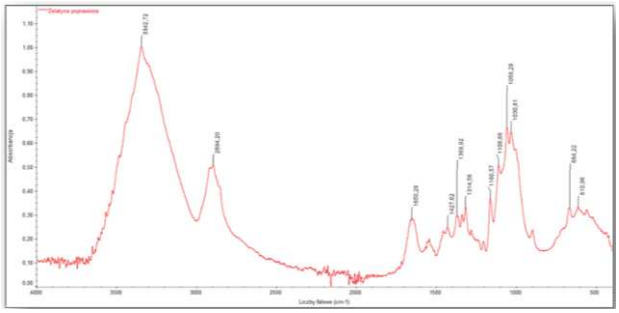

FIG. 1. FTIR spectra BNC/gelatin composite.

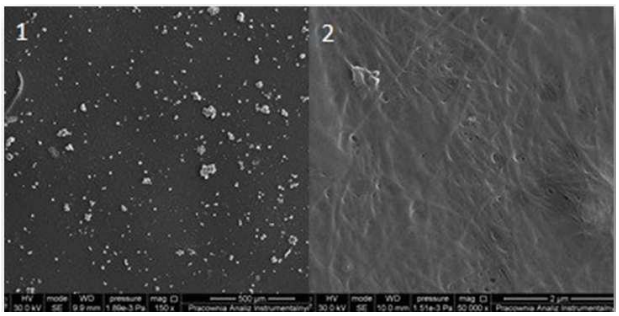


FIG. 2. SEM image of BNC/gelatin composite: 1) 500 μm, 2) 2 μm.

New composite based on BNC and gelatin shows good swelling properties. Preliminary biological studies showed that the material obtained is biocompatible.

## Conclusions

Strong interactions between bacterial nanocellulose and gelatin lead to the new composite material. The swelling properties of new material can be useful in biomedical and cosmetic applications. New material can be considered as wound dressing material.

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