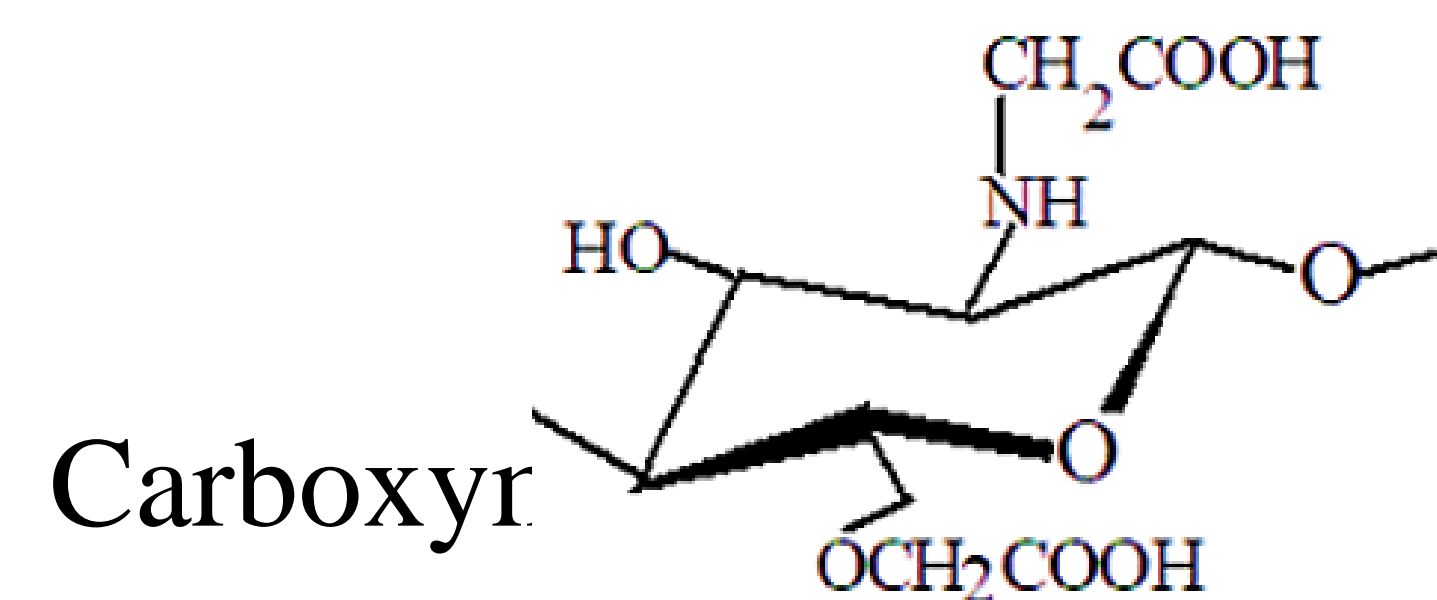
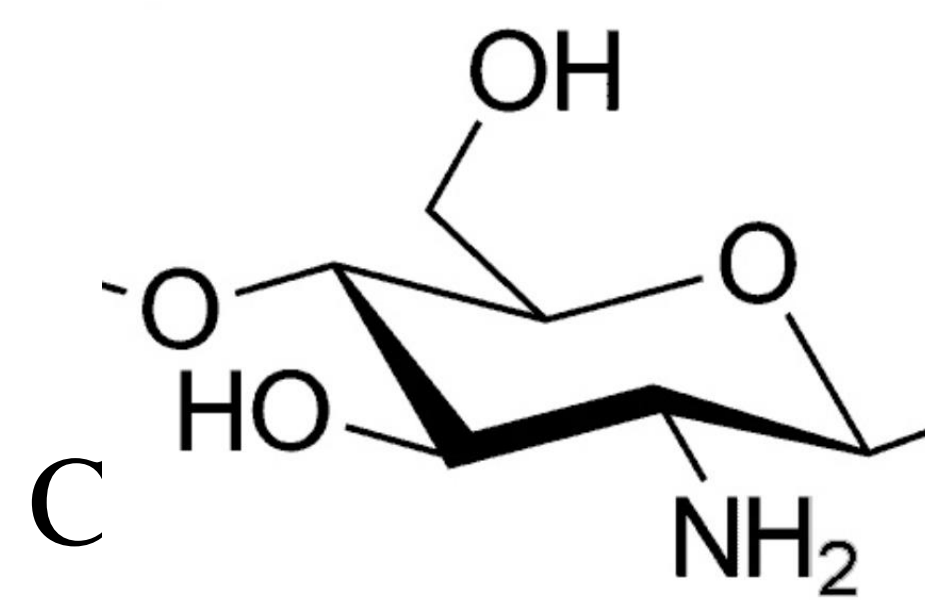


Introduction

Chitosan (Ch) is a biodegradable biopolymer. It is obtained from post-production waste such as crab or shrimp shells. It is insoluble in water. Carboxymethyl chitosan (CMCh) is a biocompatible, biodegradable derivative of chitosan. It is also non-toxic and water-soluble and has antibacterial properties.



The aim of the study was to compare the mechanical and morphological properties of chitosan and carboxymethyl chitosan.

Methodology

Chitosan was dissolved in 0.1M acetic acid. Carboxymethyl chitosan was dissolved in water. The solutions were poured onto PS plates to form thin films.

The analyses were performed using:

- a scanning electron microscope,
- an atomic force microscope,
- a Zwick & Roell Z.0.5 testing machine.

Results

Tab. 1 Mechanical properties of Ch and CMCh films.

Sample	Young's modulus (GPa)	Tensile strength (MPa)	Tensile strain at break (%)
Ch	3,5±0,6	98,6±22,7	4,7±1,6
CMCh	3,0±0,4	56,6±9,6	1,6±0,4

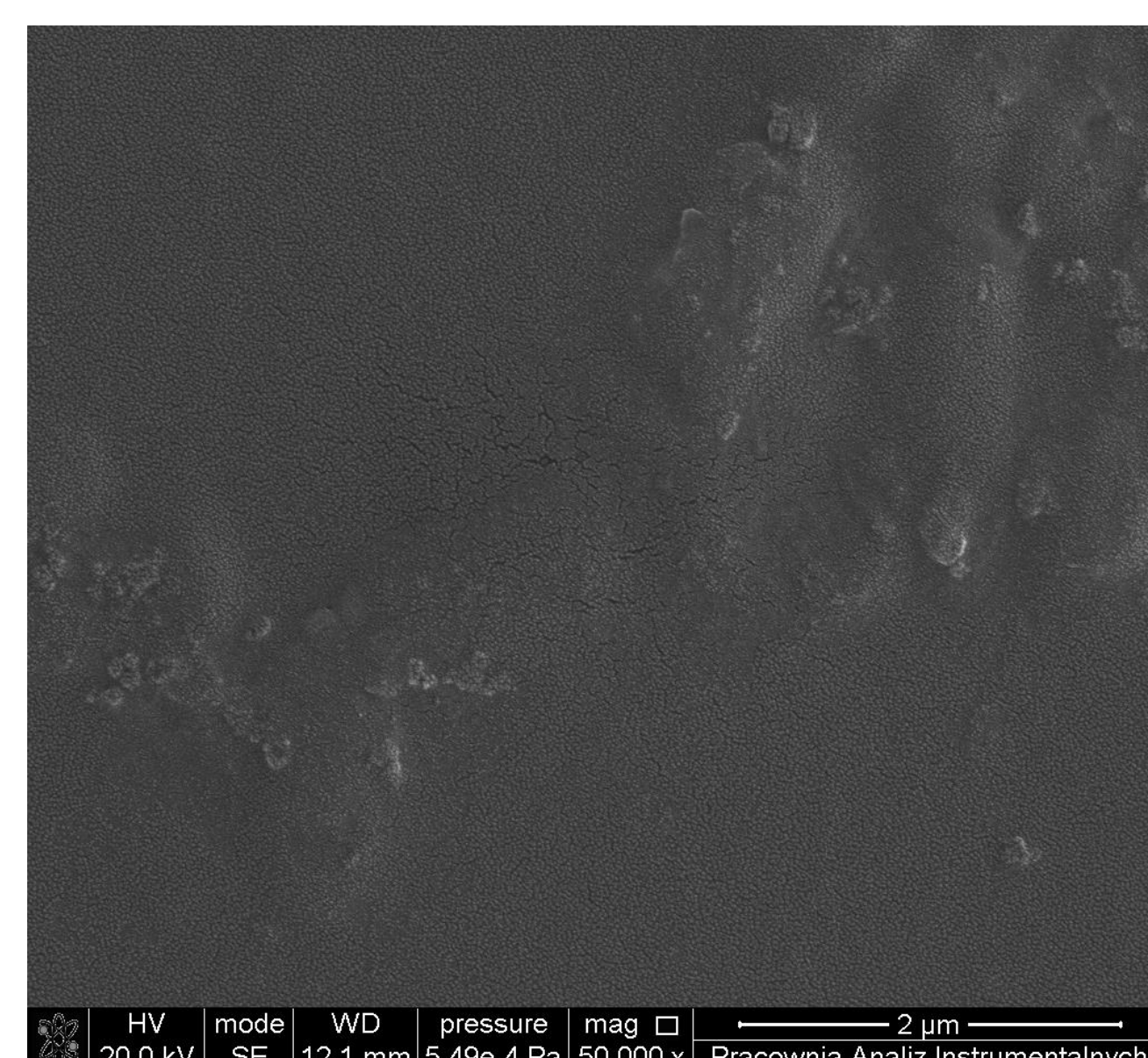
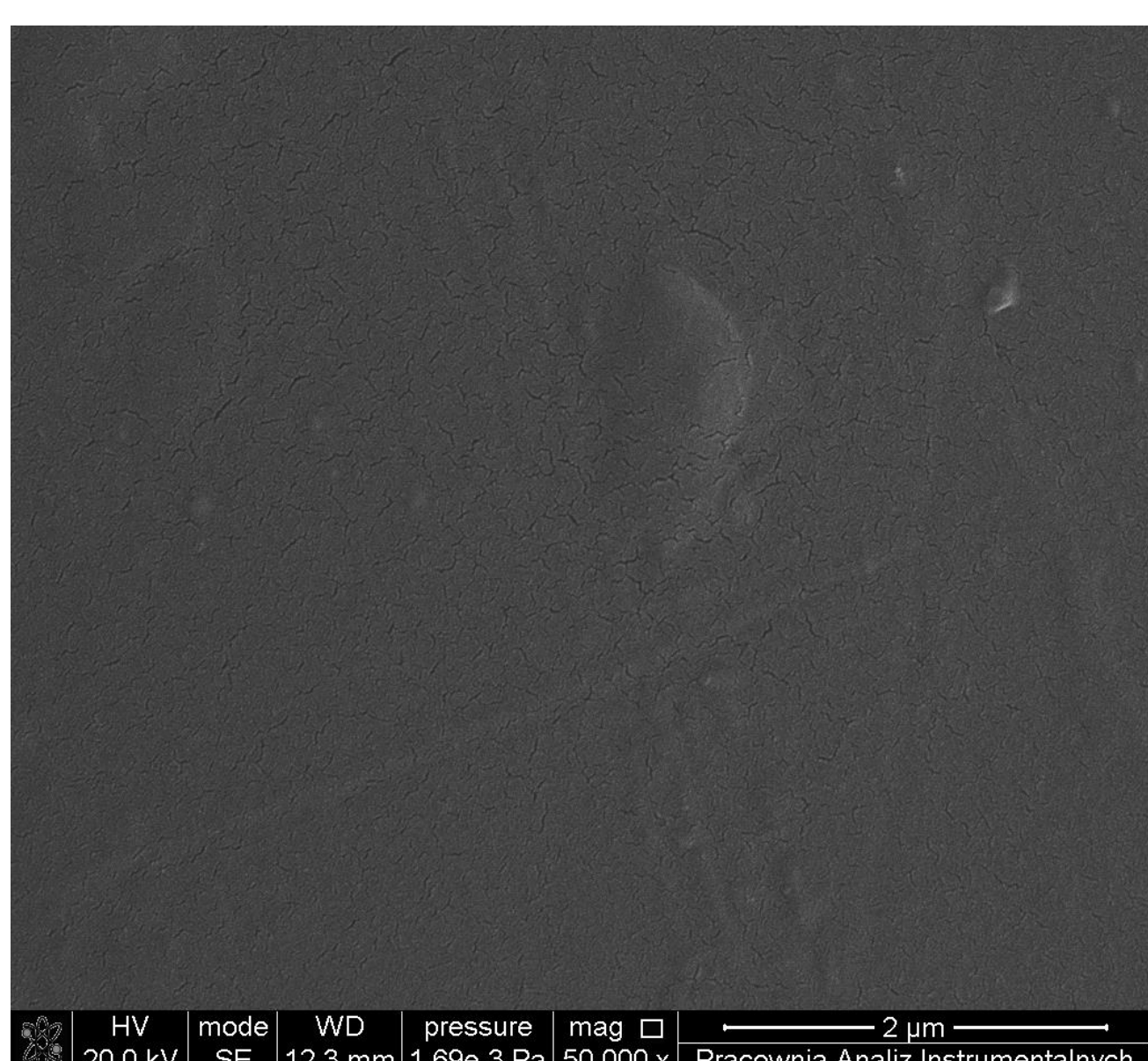
Tab. 2 Roughness parameters of Ch and CMCh films.

Sample	Rq [nm]	Ra [nm]
Ch	10,80	8,79
CMCh	35,10	25,00

Chitosan

Carboxymethyl chitosan

SEM



AFM

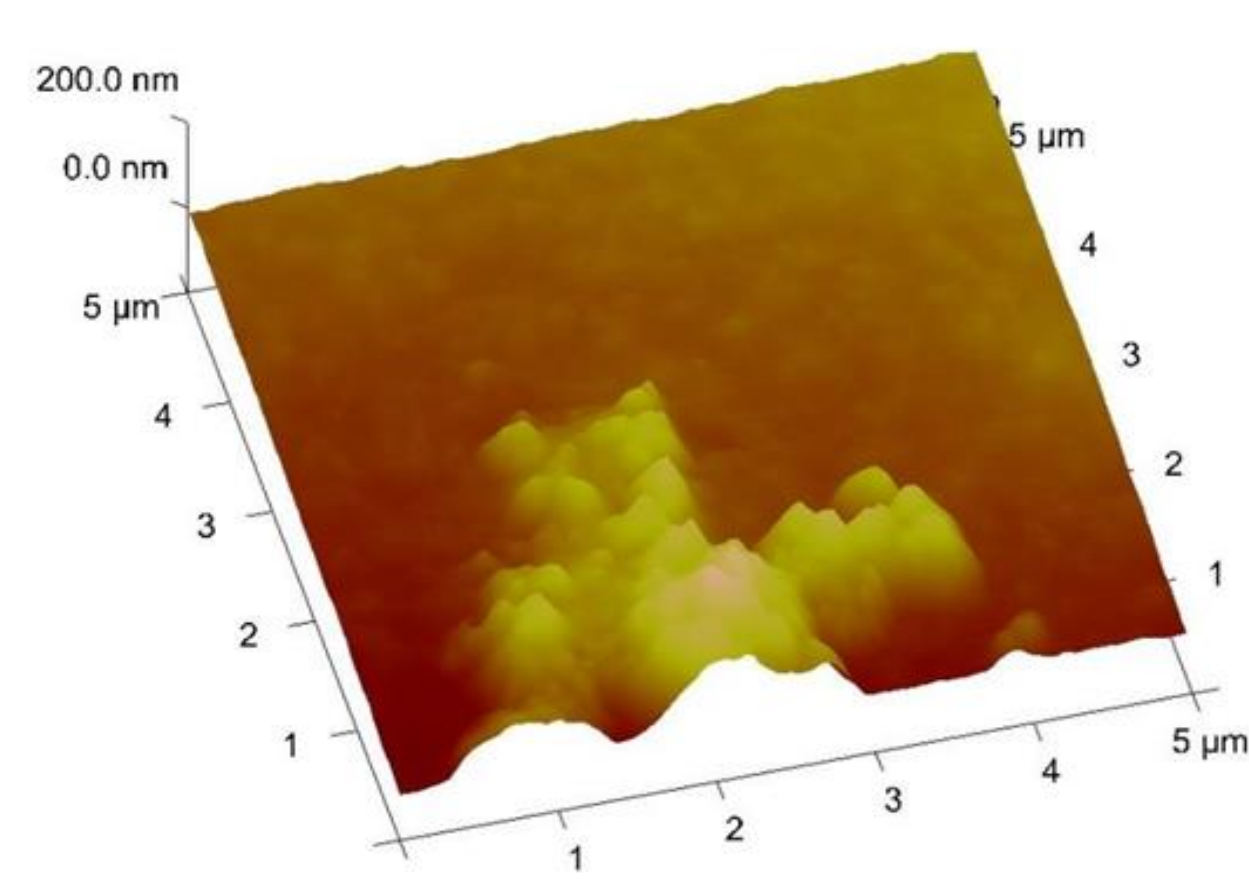
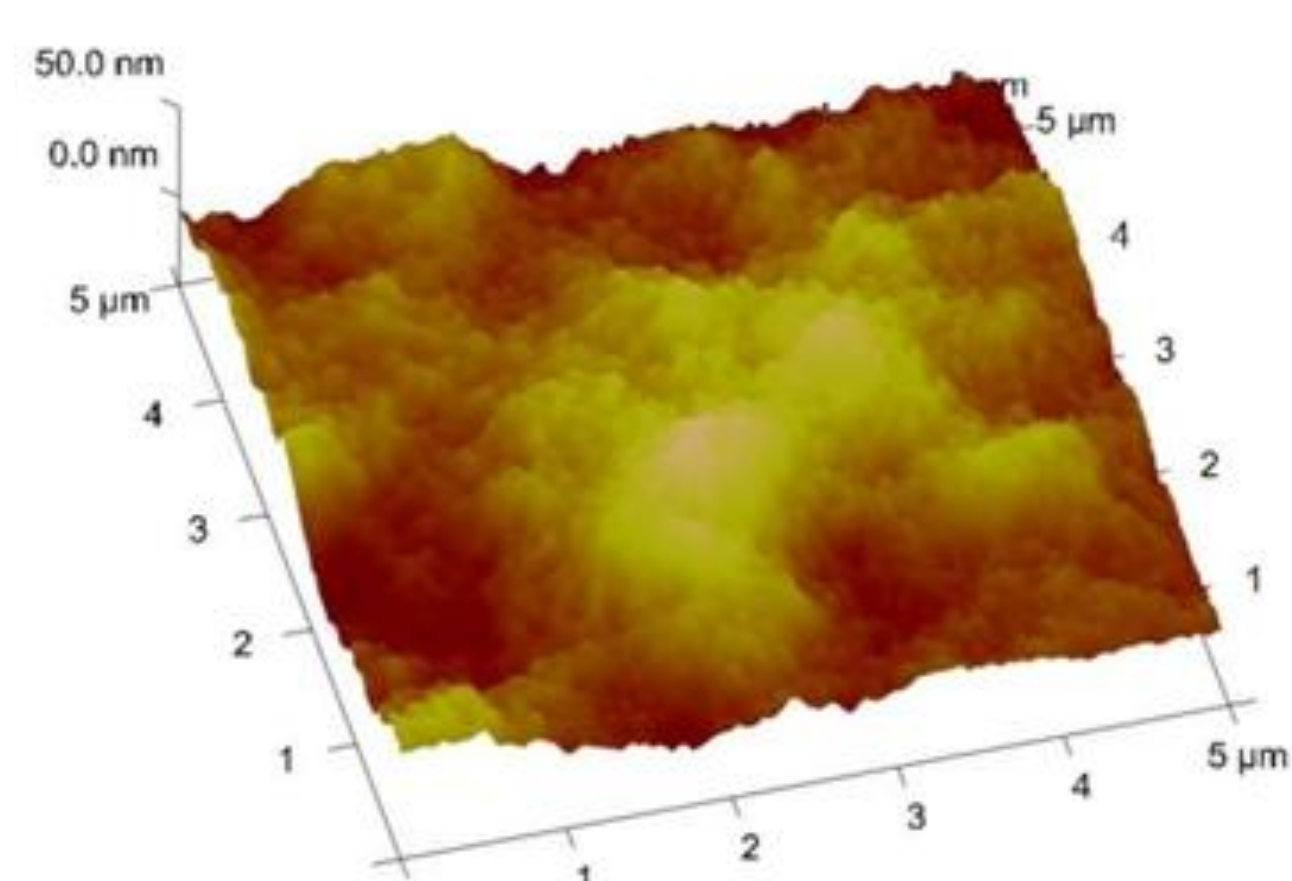


Figure 1. Representative SEM and AFM images of film surfaces of chitosan and carboxymethyl chitosan.

Summary

- The values of the mechanical parameters CMCh are lower than the values of Ch.
- Chitosan film had the smoothest surfaces.
- For CMCh film, the surface morphology is characterized by a more corrugated surface. The roughness parameter being about 3 times higher than that for Ch film.

Literature

- [1] A. Labidia, A. M. Salaberria, J. Labidi, M. Abderrabba, *Microchemical Journal* **2019**, 148, 531–540.
- [2] Z. Shariatina, *International of Biological Macromolecules* **2018**, 120, 1406-1419.