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Nanofibrillated and bacterial celluloses as renewable piezoelectric sensor materials

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Cellulose based nanomaterials, generally known as nanocellulose, are interesting renewable biomaterial which has potential applications for example in material science, electronics and biomedical engineering and diagnostics [1]. Cellulose has a strong ability to form light-weight, highly porous, entangled networks makes nanocellulose suitable as substrate or membrane material for various applications, for example as a material for in supercapacitors in different ways [2, 3, 4].

The piezoelectricity of wood was proposed already in 1950's [5], but only slightly studied since. Here, we report the experimental evidence of significant piezoelectric activity of different type nanocellulose films. We have studied both wood-based cellulose nanofibril (CNF) films [6] and bacterial nanocellulose (BC) films [7] (see Figure 1), as well as composite of chitosan and cellulose nanocrystals (CNC) [8]. Our results suggest that nanocellulose is a potential bio-based piezoelectric sensor material.

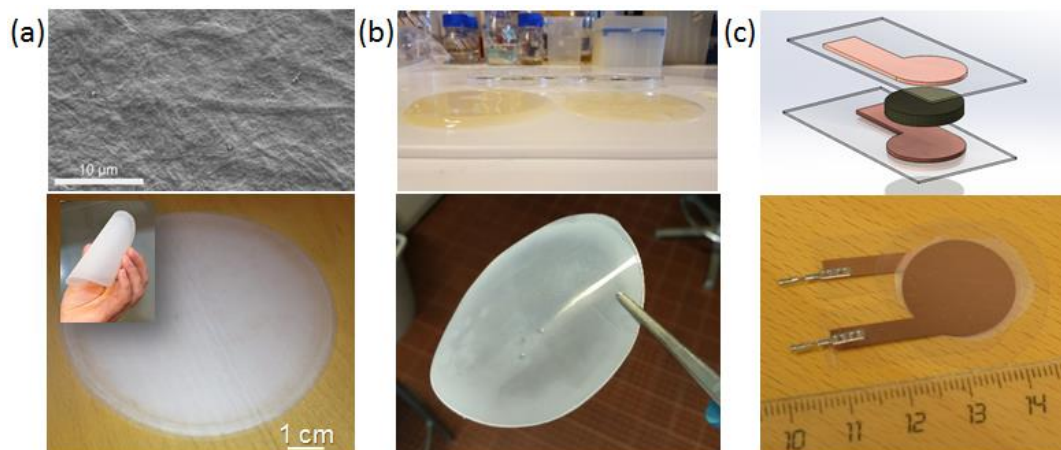


Figure 1. (a) wood based nanocellulose film, (b) bacterial nanocellulose film, (c) piezoelectric sensor.

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