Fabrication of Leather-like Biomaterial derived from Bacterial Nanocellulose by Using an Optimized Casting Process

Cellulose is primarily synthesized by plants but is also formed extracellular by various types of microorganisms [1] In general, most bacteria synthesize extracellular polysaccharides, such as bacterial nanocellulose (BNC) for cell protection [2]. BNC is generated in a unique form on the surface of liquid media with advantages like mechanical strength, free hydroxyl groups and high water content, that can be used in several applications [3] One of these aimed applications is the use of fermentation generated BNC as a leather-like biomaterial in vehicle interieur. In this study, a leather-like biomaterial was successfully produced, and the synthesized BNC was used as a re-casted matrix with plasticizers, additional fillers and cross-linking agents to optimize its mechanical properties for interieur purposes. The characterization of the leather-like BNC before and after modification was performed by evaluation of parameters such as water binding properties and tensile strength. It was shown that cross-linking of cellulose fibers reduced the tensile strength but achieved a coating function of the material. Additional examined additives increased the maximum elongation. Further investigations were carried out using FT-IR spectrometry and thermogravimetric analysis to examine the structural differences in more detail. Based on the results, BNC can be considered as a potential candidate for a future leather-like biomaterial.

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