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# Preparation and characterization of contact active antibacterial surface based on chemically modified nanofibrillated cellulose by phenanthridinium silane salt

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## Abstract

The main object of this research is chemical modification of the nanofibrillated cellulose (NFC) surface with a phenanthridinium silane salt to develop durable non-leaching antibacterial surface. Initially, (3 trimethoxysilylpropyl) phenanthridinium iodide (TMSPHI) as an antibacterial agent was synthesized using (3-chloropropyl trimethoxysilane) (CPTMS) and phenanthridine in the presence of potassium iodide. Subsequently, NFC was cationized by reaction of its hydroxyl groups with the trimethoxysilane group of TMSPHI to prepare the modified sample (NFC-TMSPHI). The synthesized TMSPHI was characterized by FT-IR, <sup>1</sup>H and <sup>13</sup>C NMR spectroscopies. The modified NFC samples were also characterized by FE-SEM/EDX, XRD, TGA, elemental analysis, contact angle measurement, FT-IR, UV-Visible and fluorescence spectroscopies. The obtained NFC-TMSPHI samples presented fluorescence property at the maximum emission wavelength in the range of 539-549 nm. Additionally, the

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