Electronic Supplementary Material (ESI) for Journal of Materials Chemistry B

Supporting Information: Keratin-Based Antimicrobial Textiles, Films, and Nanofibers

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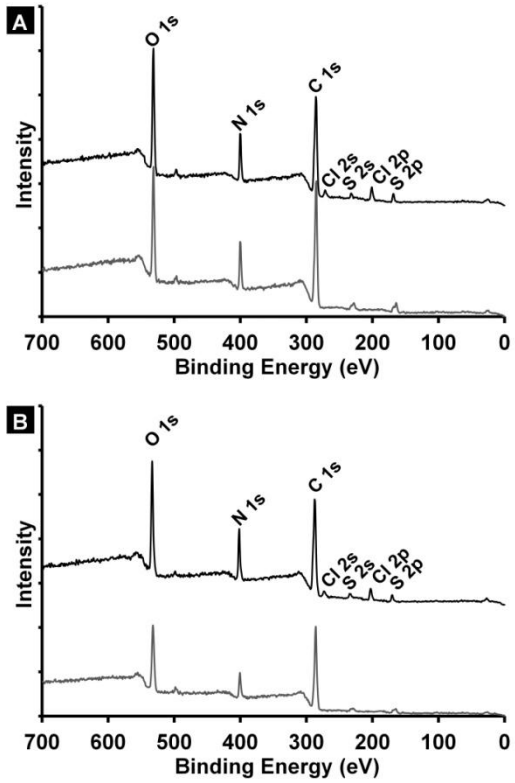

Figure S1. XPS analysis of A) unmodified wool cloth (bottom spectrum, gray line) and wool fabric chlorinated at pH 5 for 1 h (top spectrum, black line) and B) unmodified wool cloth (bottom spectrum, gray line) and wool fabric chlorinated at pH 6 for 1 h (top spectrum, black line). Intensity values of wool-Cl XPS spectrum offset for clarity.

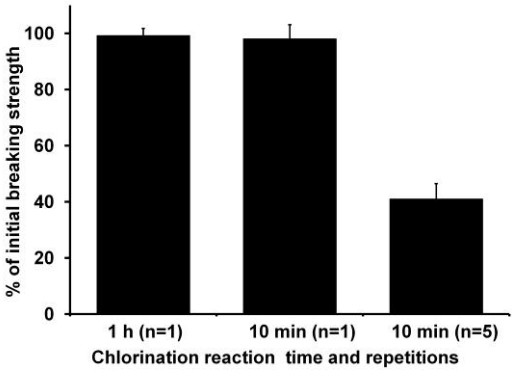

Figure S2. The breaking strength of wool cloth as a function of chlorination reaction time and chlorination repetitions conducted at pH 4, expressed as % of the untreated textile strength.

Wool-Cl Sample	Normalized Cl Content (%)
Initial	100 ± 6.9
Post Wash Cycle 1	92.2 ± 4.7
Post Wash Cycle 2	92.8 ± 8.0
Post Wash Cycle 3	86.7 ± 4.0
Post Wash Cycle 4	89.0 ± 4.4
Post Wash Cycle 5	89.4 ± 4.8

Table S1: The Cl contents of wool chlorinated at pH 4 for 1 h after 0 to 5 wash cycles. The Cl content of the wool-Cl samples is normalized to that of the initial sample.

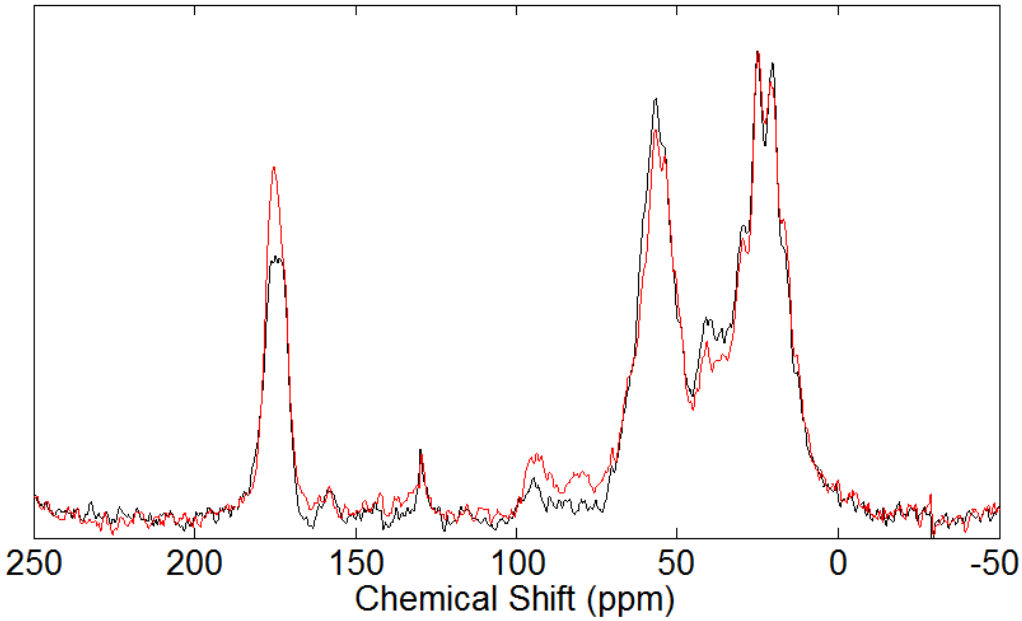

Figure S3. Solid state carbon NMR spectra of wool fabric (black) and wool-$Cl_{(5x)}$ (red). The repeated chlorination of wool leads to an increase in the CO (176 ppm) peak intensity and change in the shape of the peak.

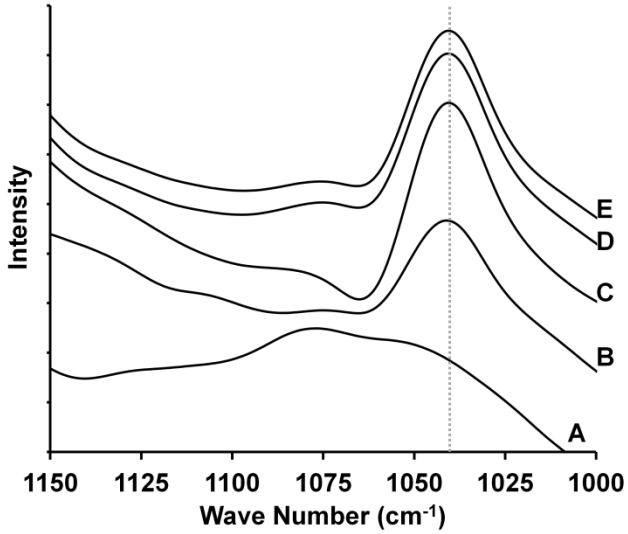

Figure S4. FTIR absorbance spectra of A) wool fabric, B) wool cyclically chlorinated 5 times (wool-$Cl_{(5x)}$), C) wool oxidized with performic acid for 30 min, D) wool-Cl, reacted for 10 min, and E) wool-Cl, reacted for 1 h. The vertical dashed line designates the expected absorbance band of cysteic acid (~1040 cm^{-1}). Intensity values of the absorbance spectra have been offset for clarity of presentation.

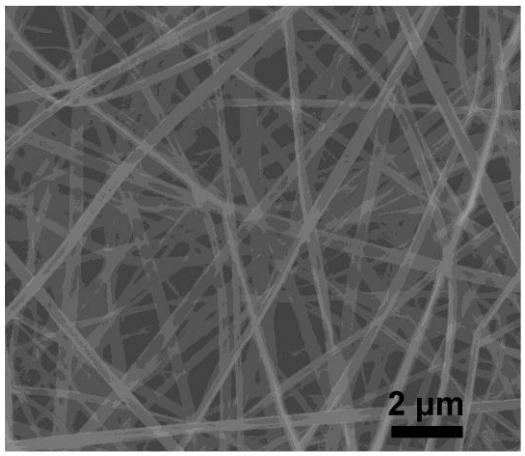

Figure S5. SEM characterization of regenerated cellulose nanofibers generated through the deacetylation of cellulose acetate fibers electrospun from a formic acid-based dope.

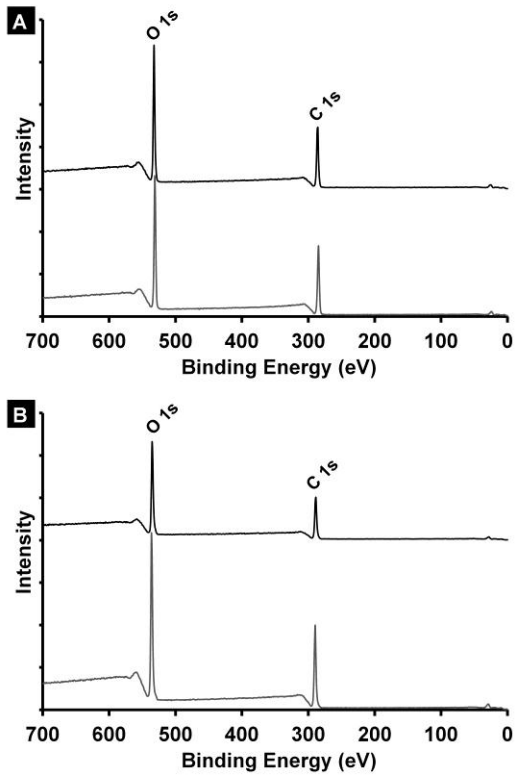

Figure S6. XPS characterization of regenerated cellulose materials containing no keratin (i.e., negative control materials). A) Regenerated cellulose films, as prepared (bottom spectrum, gray line) and following exposure to chlorination reaction conditions (top spectrum, black line). B) Regenerated cellulose nanofibers, as prepared (bottom spectrum, gray line) and following exposure to chlorination reaction conditions (top spectrum, black line). Intensity values of those samples exposed to bleach solutions were offset for clarity.