

# Non-ionic assembly of nanofibrillated cellulose and polyethylene glycol grafted carboxymethyl cellulose and the effect of aqueous lubrication in nanocomposite formation.

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## Electronic supplementary information

Electronic supplementary information includes : FTIR data showing the PEG peak at  $1650\text{ cm}^{-1}$  (S1), QCM-D data showing pH dependent changes in conformation (S2), QCM-D data showing pH changes after adsorption of PLLgPEG on NFC (S3), Normal forces on approach and separation for NFC vs. cellulose sphere (S4), and normal forces profile on approach between the NFC film and cellulose sphere after adsorption of CMC at both pH 4.5 and pH 7.3 (S5).

### S1 FTIR data of CMC-g-PEG

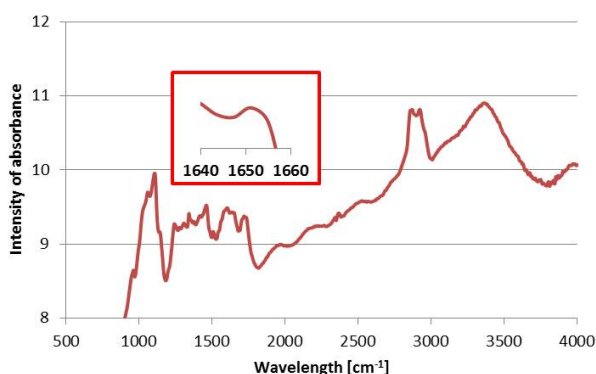
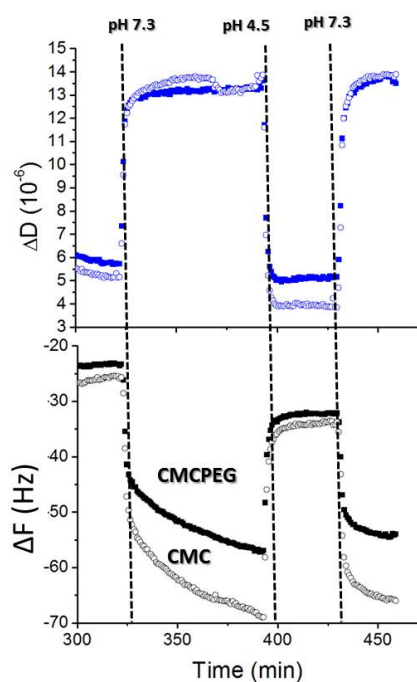


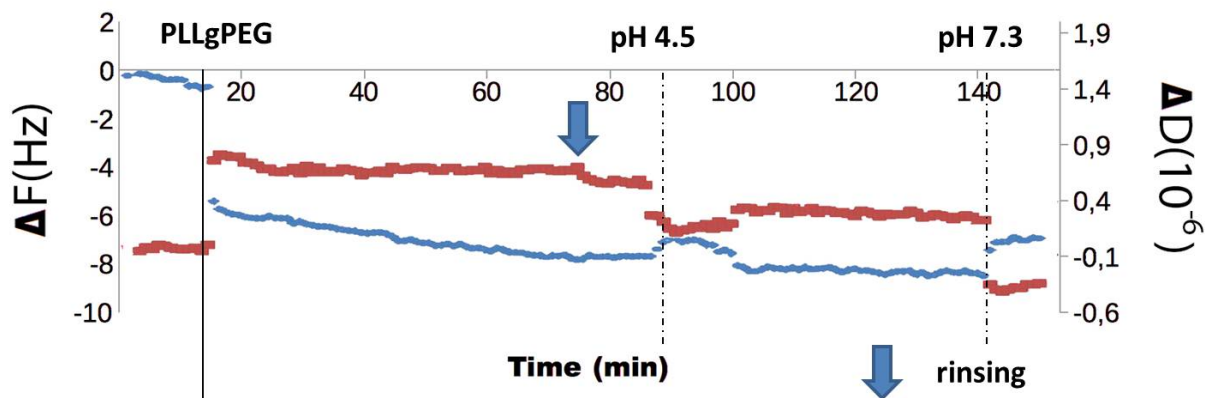
Fig S1 FTIR data showing the PEG peak at  $1650\text{ cm}^{-1}$

### S2 QCM-D data showing pH dependent changes in conformation



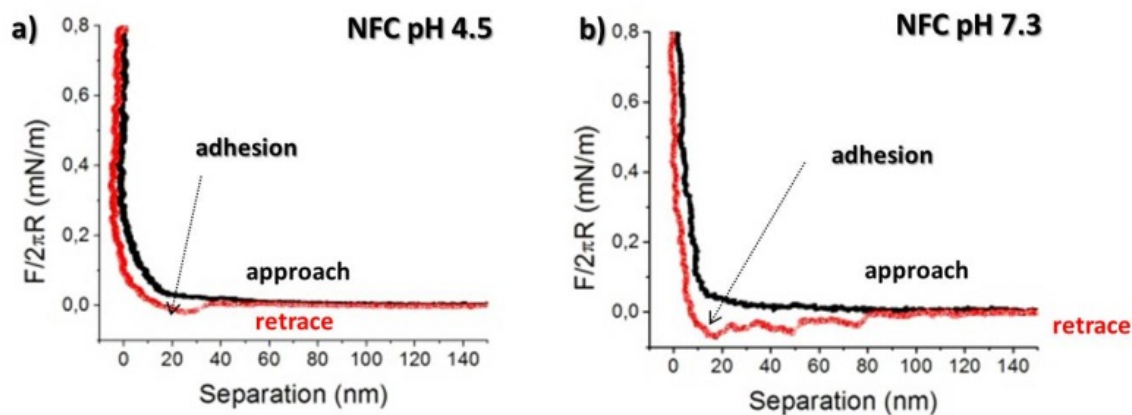
**Fig. S2** QCM-D data (3rd overtone) showing the effect of pH on the change in frequency  $\Delta F$  (black) and dissipation  $\Delta D$  (blue in online version) for CMC (open symbols) and CMC-PEG (closed symbols) adsorbed onto a spin coated NFC film (open symbols). The dotted lines indicate the point of pH changes. (pH 4.5 (0.1 mM NaAc/HAc) and pH 7.3 (0.1 mM  $\text{KH}_2\text{PO}_4/\text{NaH}_2\text{PO}_4$ ) buffer solutions).

**S3** QCM-D data showing pH changes after PLLgPEG adsorption on NFC



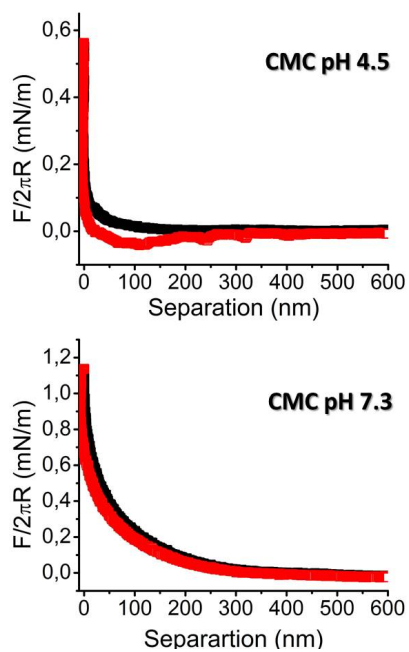
**Fig. S3** QCM-D data (3rd overtone) showing the effect of pH on the change in frequency  $\Delta F$  (black) and dissipation  $\Delta D$  (blue in online version) for PLLgPEG adsorption on NFC. The dotted lines indicate the point where pH was from pH 7.3 ( $\text{KH}_2\text{PO}_4/\text{NaH}_2\text{PO}_4$ ) to pH 4.5 (0.1 mM NaAc/HAc), buffer solutions.

**S4** Normal forces on approach and separation for NFC vs. cellulose sphere at a) pH 4.5 and b) pH 7.3



**Fig. S4** Normal Forces on approach (black, closed symbols) and separation (red open symbols) between cellulose sphere and NFC film at pH 4.5 (a) and pH 7.3 (b)

**S5** Normal force profiles on approach between the NFC film and cellulose sphere after adsorption of CMC at both pH 4.5 and pH 7.3



**Fig. S5** Normal force profiles on approach (black) and separation (red) between a cellulose sphere and NFC film after CMC adsorption at 0.1mM pH 4.5 and pH 7.3 buffer solutions