Electronic Supplementary Material (ESI) for Lab on a Chip.

SUPPLEMENTARY INFORMATION

Nanoporous Silk Films with Capillary Action and Size-Exclusion Capacity for Sensitive Glucose Determination in Whole Blood

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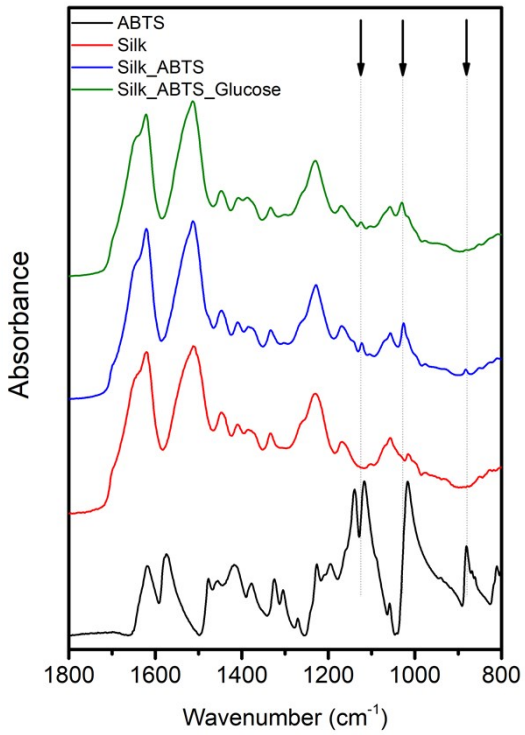

Figure S1. ATR-IR analysis of ABTS-Tyrosine bonding. ATR-IR spectra of ABTS, annealed SF, and SF with 6 % w/w ABTS before and after the reaction with 12 mM glucose PBS buffer. Samples with ABTS also contained 3 % w/w HRP and 2 % w/w GOx.

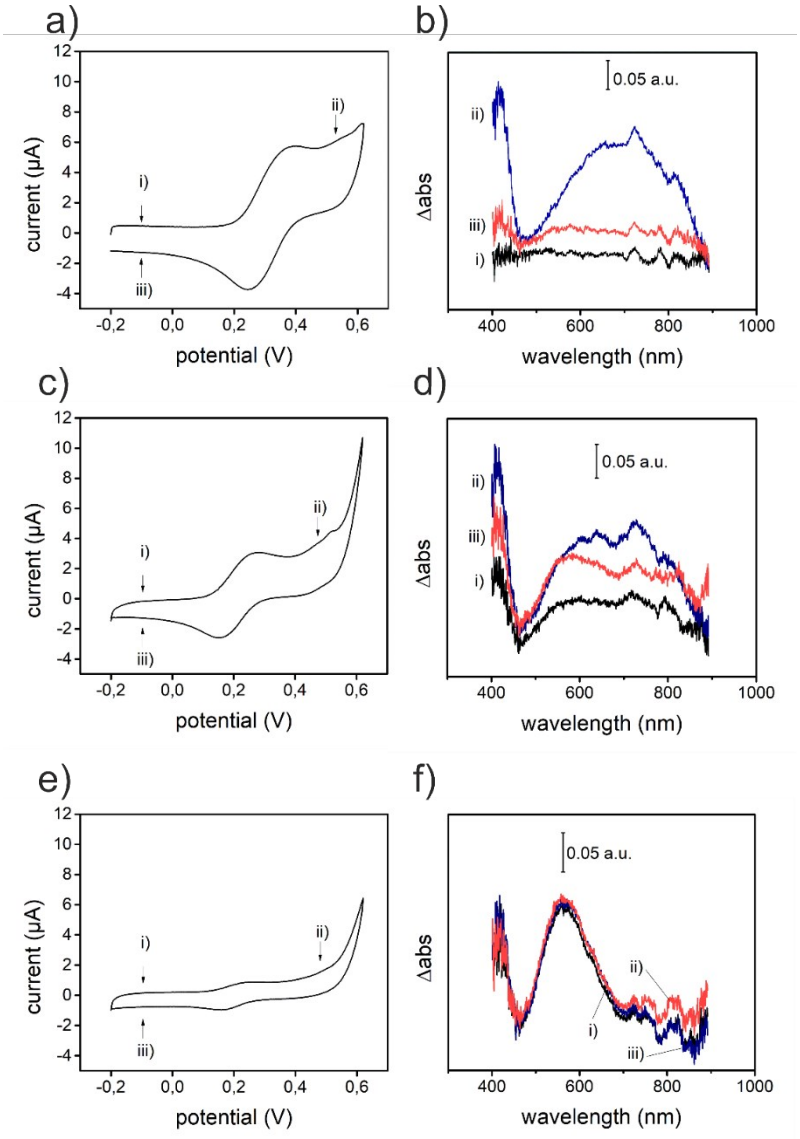

Figure S2. Spectroelectrochemical analysis of ABTS-Tyrosine bonding. Cyclic voltammetries (left) and simultaneous absorbance spectra (right) at indicated applied potentials, i.e. i), ii) and iii), for silk fibroin pads a-b) before and c-d) 90 s and e-f) 900 s after addition of 12 mM glucose solution.

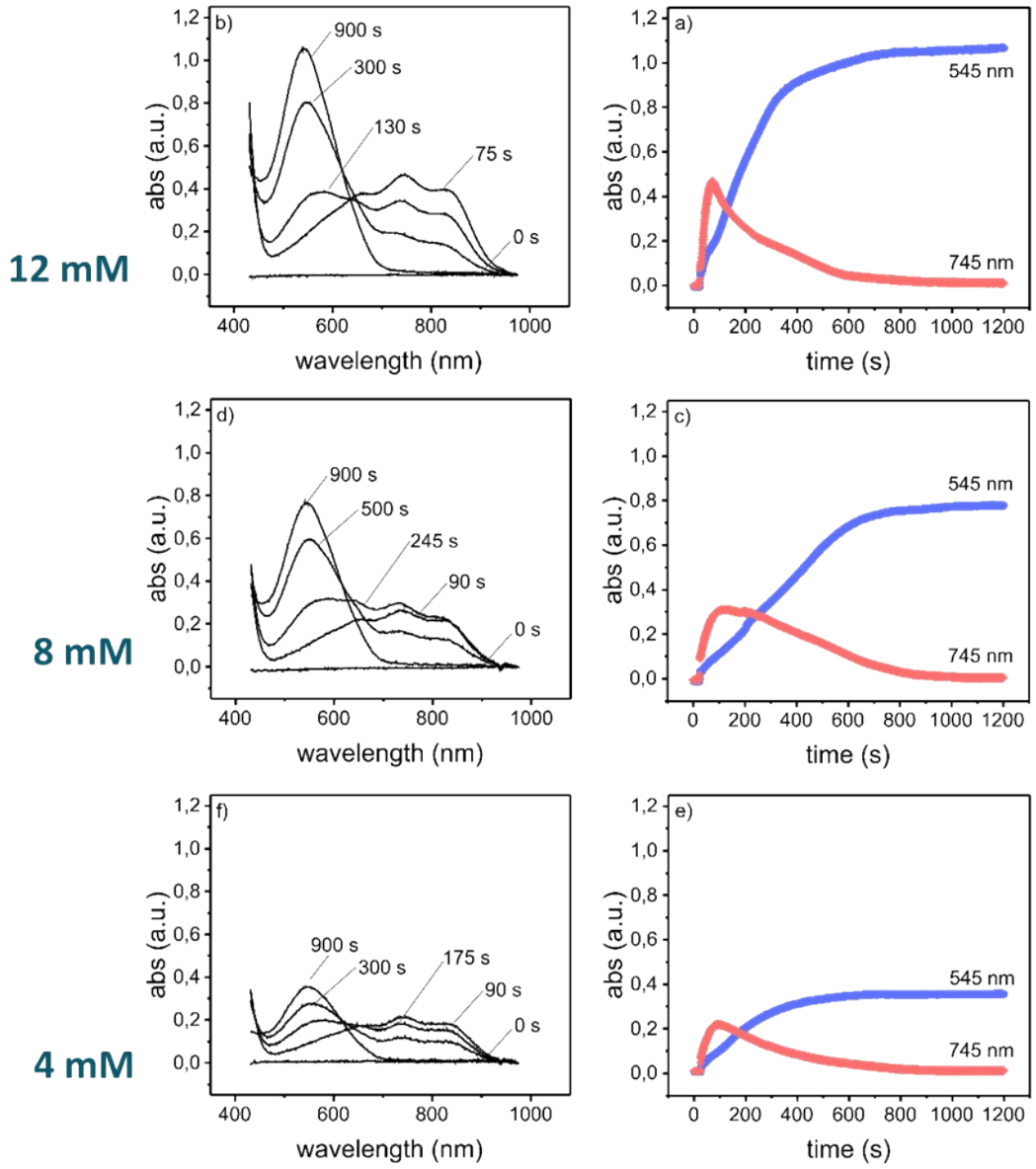

Figure S3. Absorbance variation of functionalized SF films after glucose reaction. Absorbance spectra (left) and kinetic evolution (right) of the 745 nm and 545 nm absorption bands (corresponding to the ABTS radical ion and the SF-ABTS complex, respectively) after incubation of SF films with glucose samples of 4, 8 and 12 mM glucose.

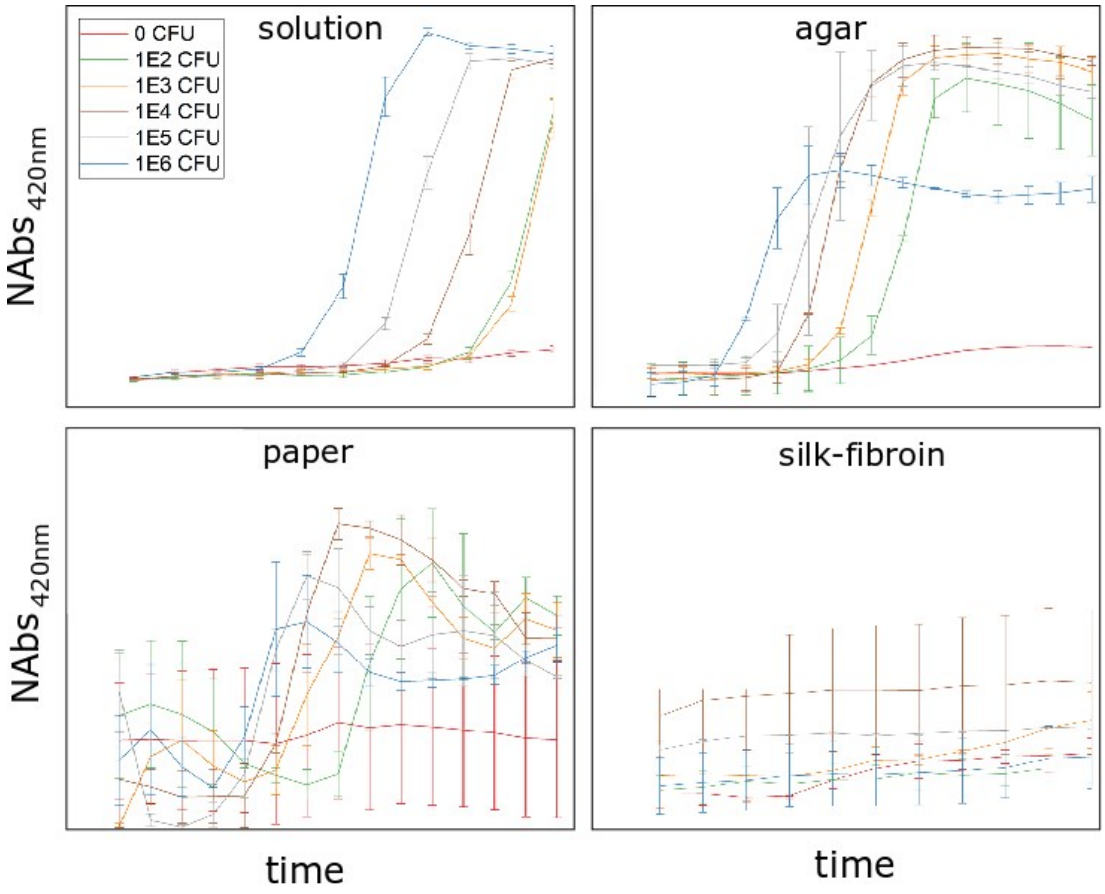

Figure S4. Functional evaluation of SF porosity. Kinetic variation of the absorbance magnitude at 420nm after reaction of bacterial suspensions with the Colitert reagent in solution (top, left) or implemented in agar gels (top, right), nitrocellulose paper matrices (bottom, left) or SF films (botter, right). Plots are the result of three consecutives experiments with different samples.

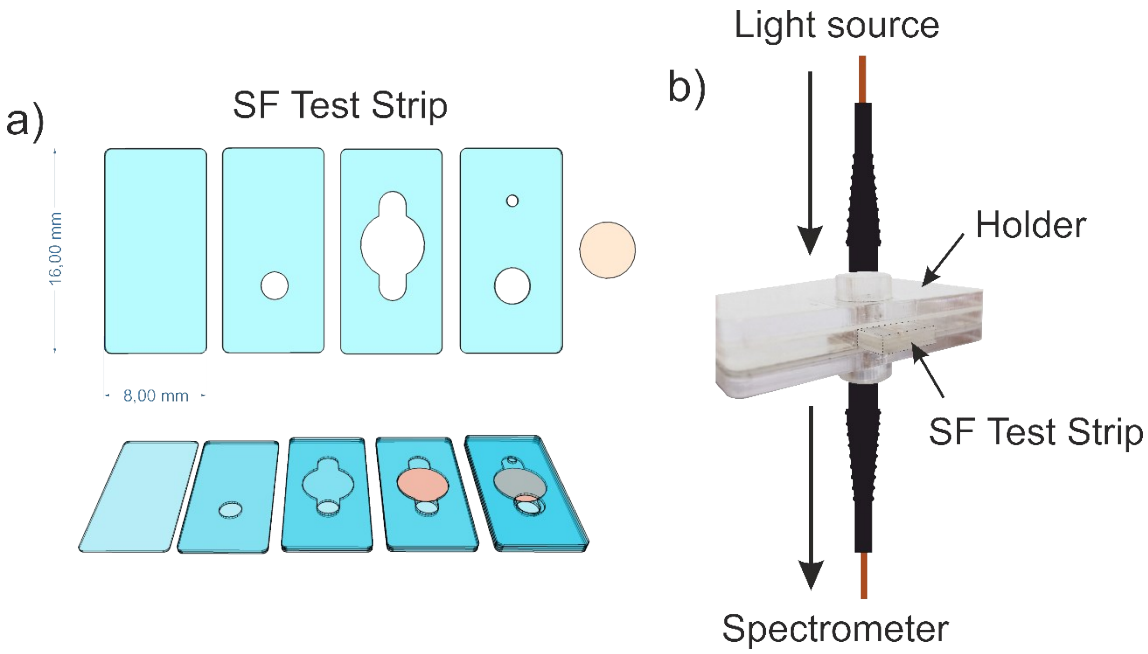

Figure S5. SF test strips. a) Scheme of the PMMA prototype layer by layer (top) and sequential assembly (bottom) for SF films positioning (red) and analyte measurement. b) Sample holder for the spectroscopical analysis of the SF films. The SF Test strip described in a) is inserted in the holder, where two optical fibers are aligned perpendicular to the SF film, situated in the center of the test strip. One of the optical fibers is connected to the light source while the second is connected to the spectrometer.

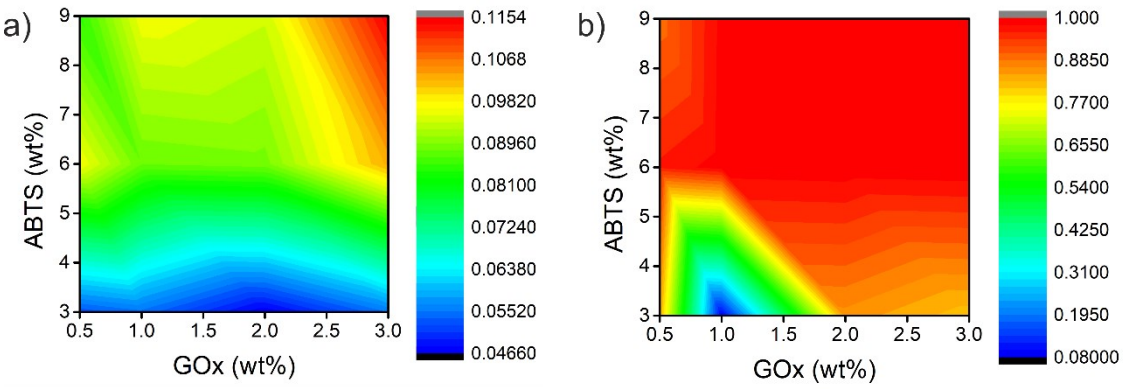

Figure S6. Biosensor optimization. a) Sensitivity (abs (a.u) mM^{-1}) and b) linearity (R^2) of the response of the biosensor depending on the % wt of ABTS and GOx respect to the SF content of the pads (HRP is always in a 3:2 w/w relation to GOx).

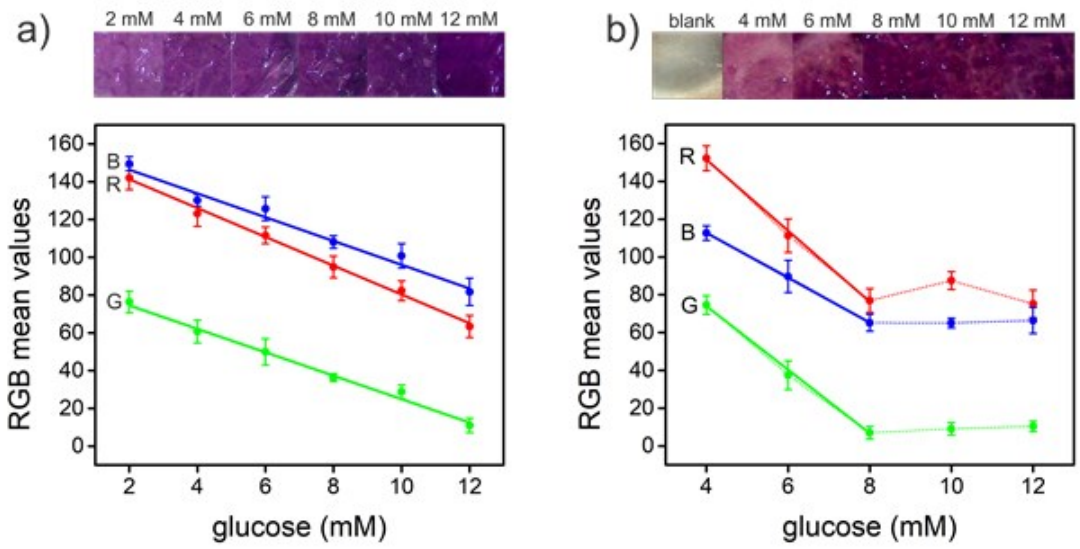

Figure S7. Glucose quantification by image analysis of SF test strips. Quantification of different glucose concentrations in a) PBS solutions and b) whole blood samples by photographing the test strips and representing the RGB contributions obtained by image analysis.