

Supporting Information

On the intimate connection between nanoscale adhesion of Yad fimbriae and macroscale attachment of Yad-decorated bacteria to glycosylated, hydrophobic and hydrophilic surfaces

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equivalent contribution

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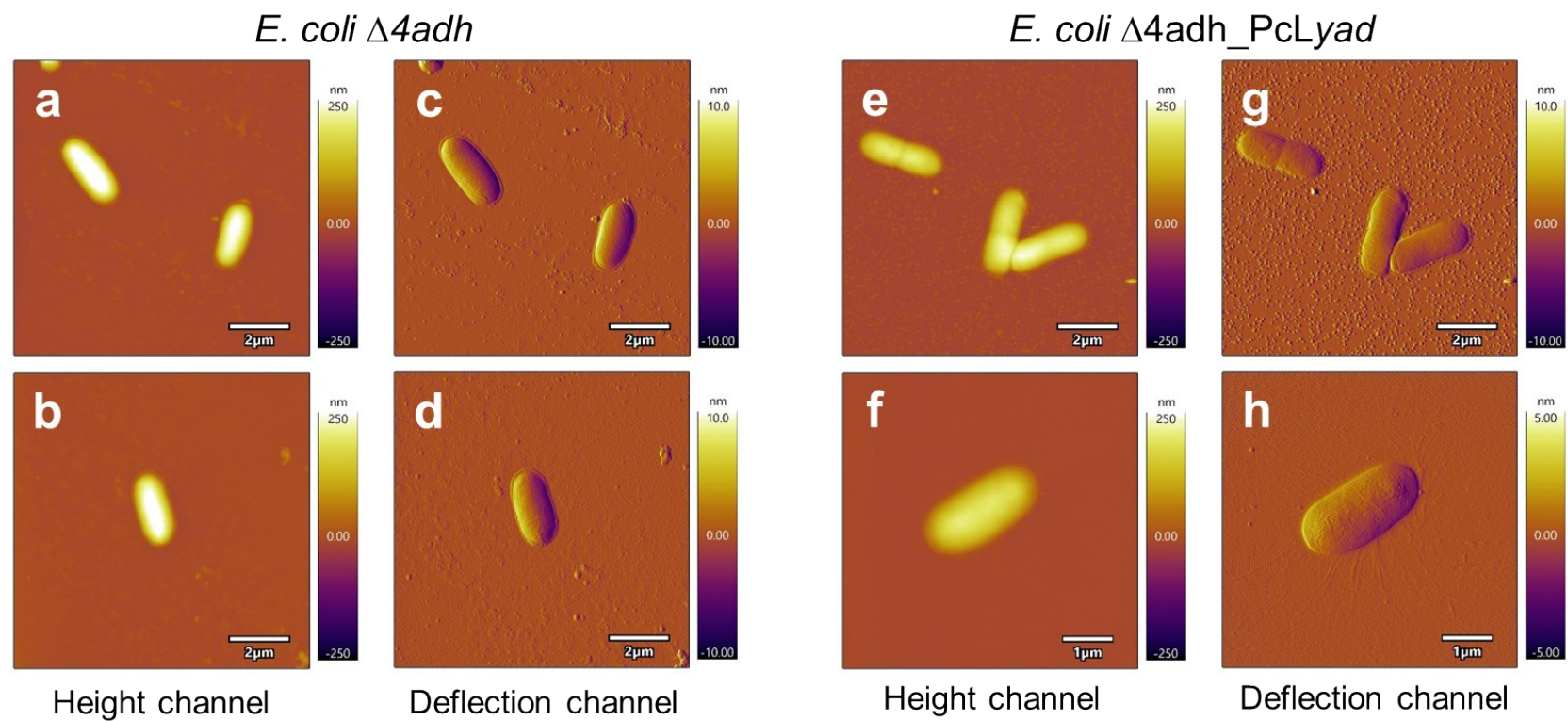


Figure S1. Images of *E. coli* $\Delta 4adh$ and $\Delta 4adh_PcLyad$ recorded by AFM operated in contact mode under air conditions at 23°C.

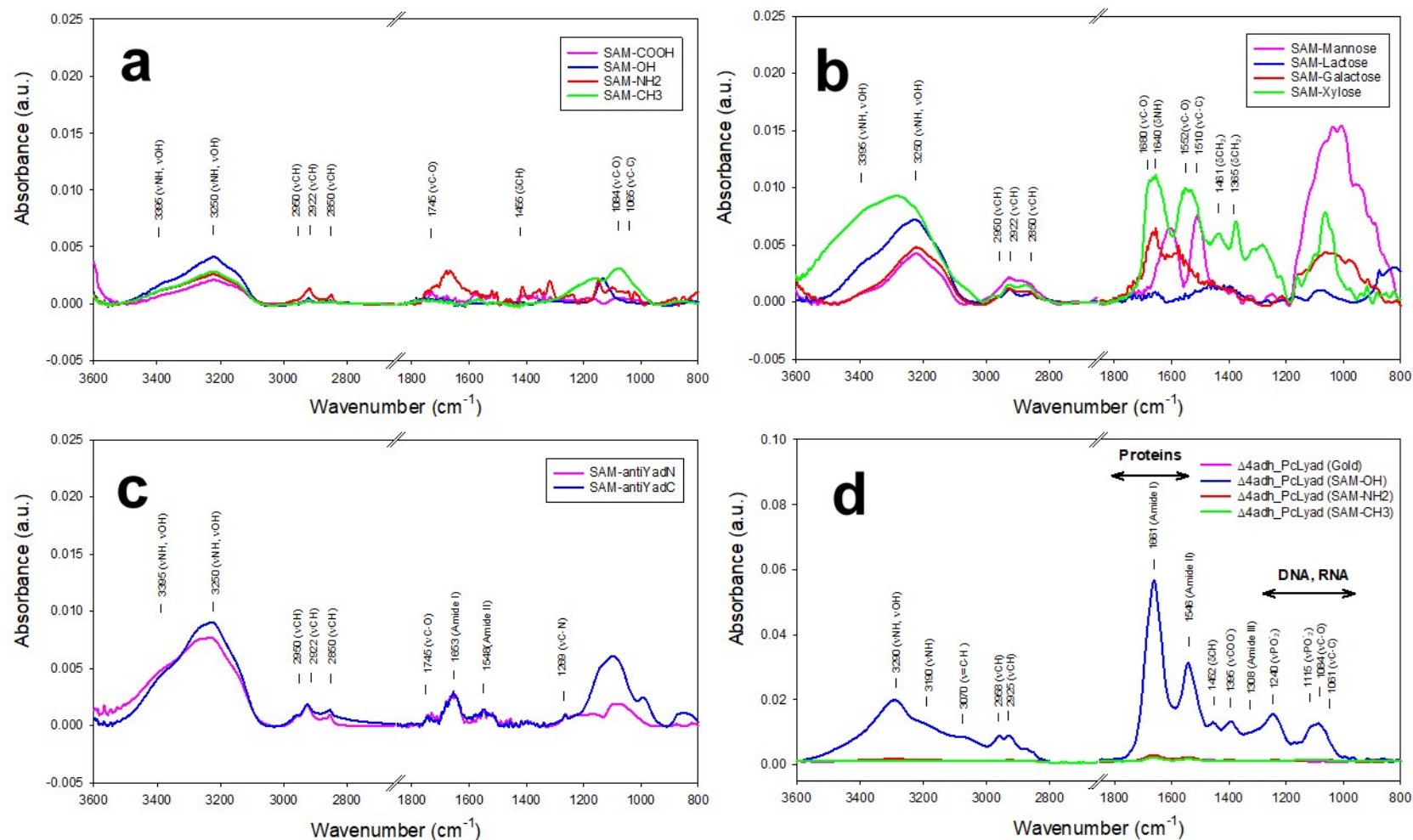


Figure S2. Infrared reflection absorption spectroscopy (IRRAS) spectra measured for the various model self-assembled monolayers (SAM) of interest in this work (indicated), and assignments of the bands.

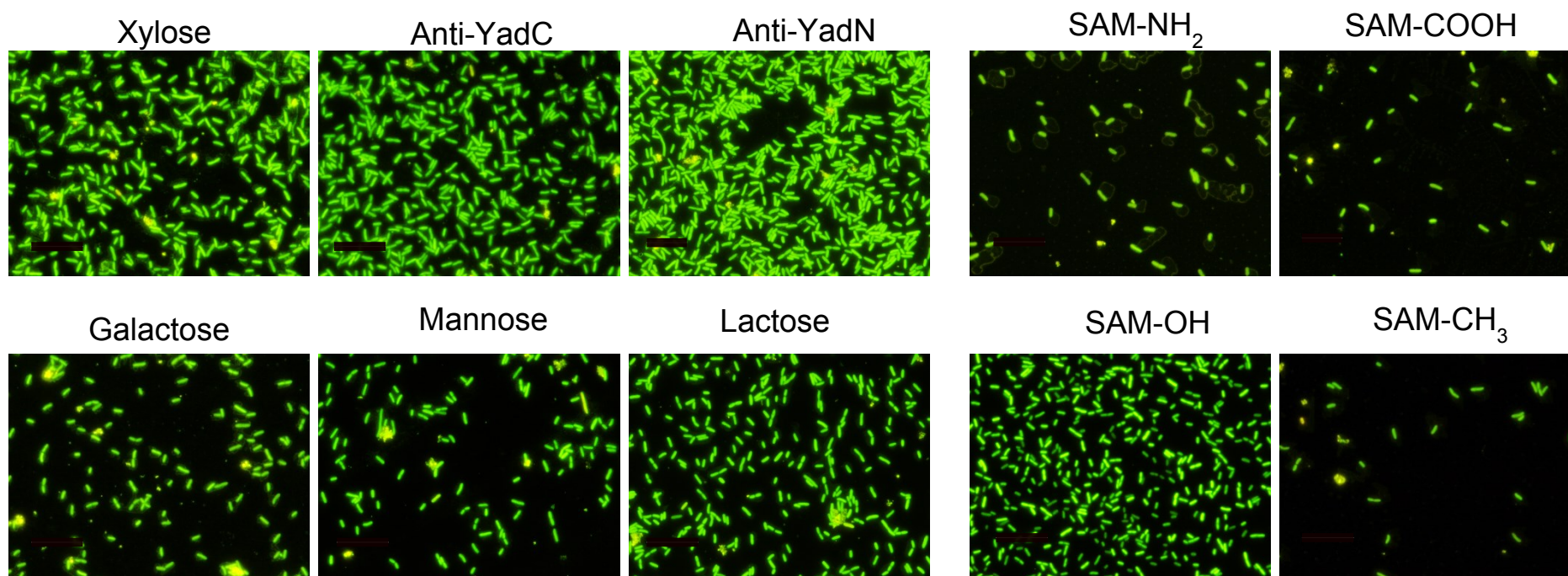


Figure S3. Representative epifluorescence images (filter cube U-MWIB3, Olympus, excitation filter: BP 460-495 nm, emission filter: LP 510 nm) of *E. coli* Δ_{4adh_PcLyad} bacteria incubated 2 hrs onto the different SAM-coated gold substrates covered by anti-YadC, anti-YadN antibodies, xylose (Xyl), galactose (Gal), lactose (Lac), mannose (Man) (indicated) and onto the SAM-NH₂, SAM-COOH, SAM-OH and SAM-CH₃ reference substrates. *E. coli* Δ_{4adh_PcLyad} bacterial cells constitutively expressing GFP were stained with PI to verify membrane integrity. Green and red fluorescence emissions were simultaneously acquired and damaged bacteria appears in yellow. Bars: 20 μ m (white).

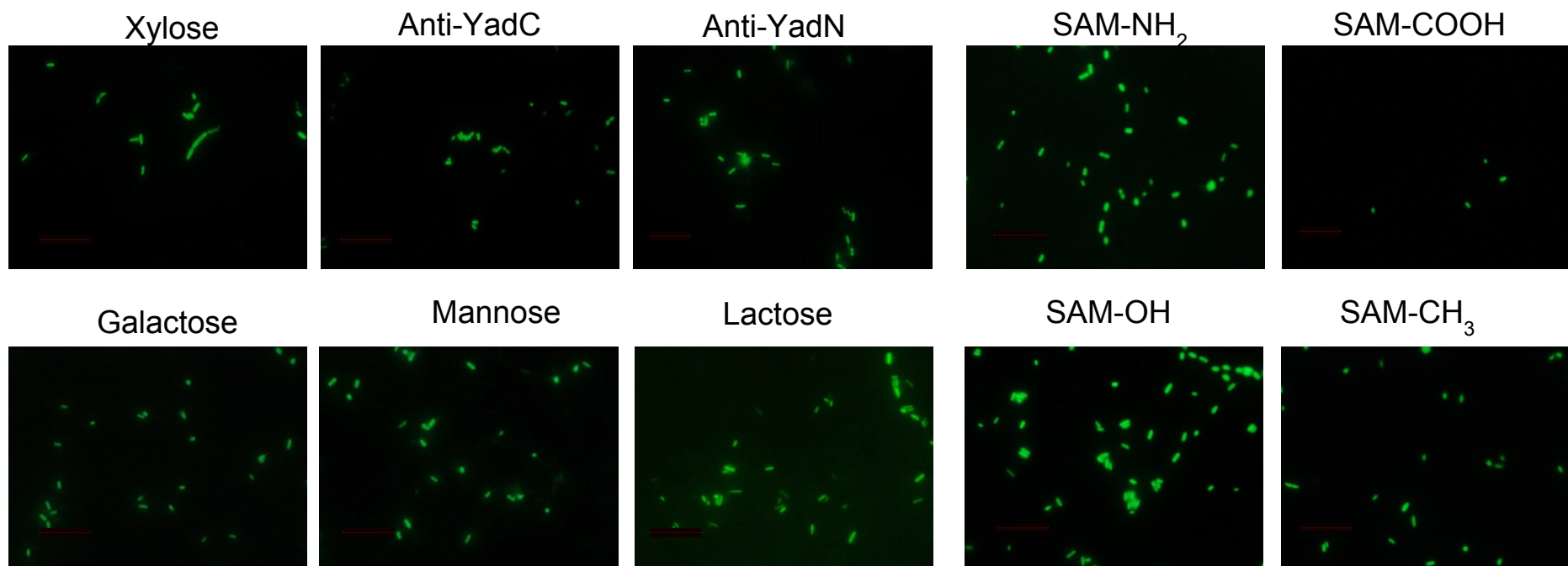


Figure S4. Representative epifluorescence images (filter cube U-MWIB3, Olympus, excitation filter: BP 460-495 nm, emission filter: LP 510 nm) of *E. coli* Δ_4adh bacteria incubated 2 hrs onto the different SAM-coated gold substrates covered by YadC, YadN antibodies, xylose (Xyl), galactose (Gal), lactose (Lac), mannose (Man) (indicated) and onto the SAM-NH₂, SAM-COOH, SAM-OH and SAM-CH₃ reference substrates. *E. coli* Δ_4adh bacterial cells constitutively expressing GFP were stained with PI to verify membrane integrity. Green and red fluorescence emissions were simultaneously acquired and damaged bacteria appears in yellow. Bars: 20 μ m (white).

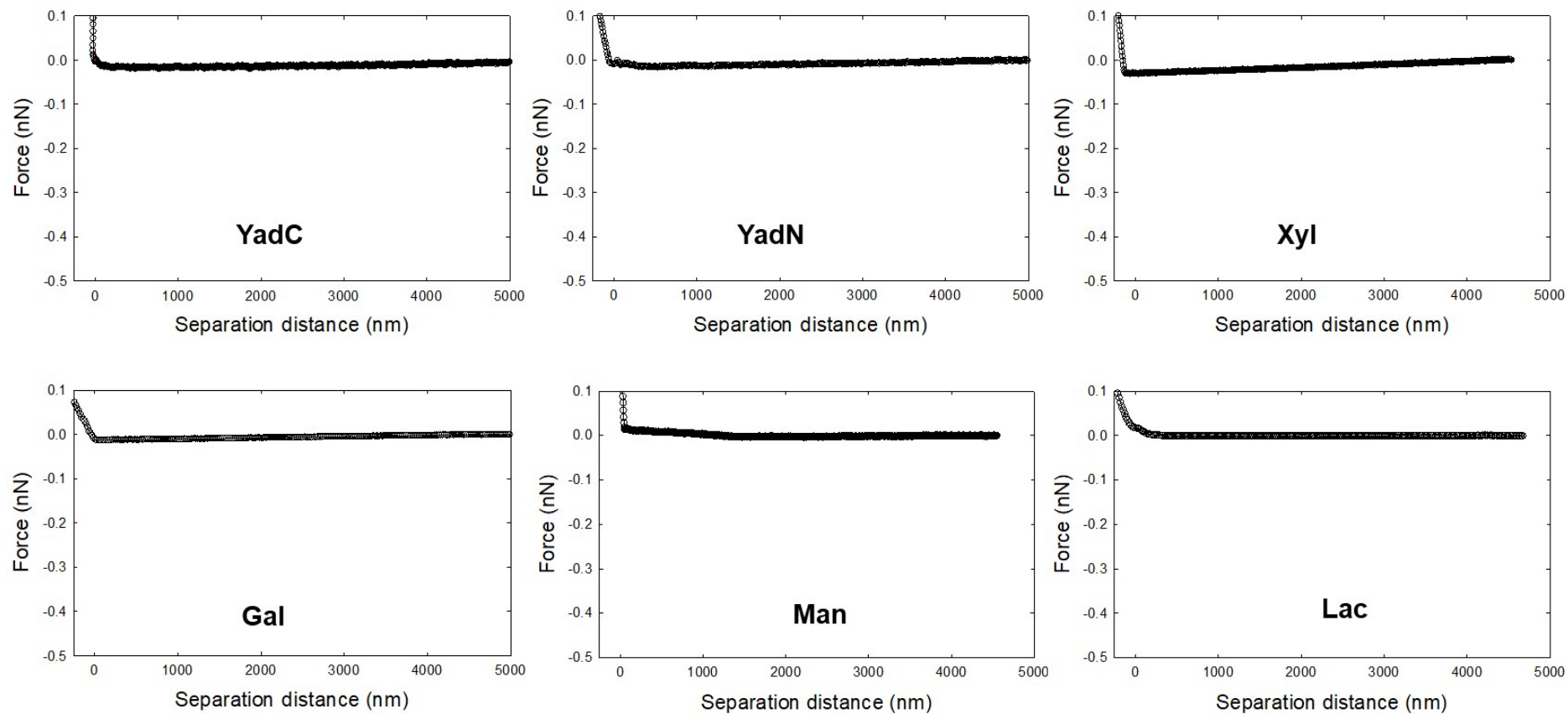


Figure S5. Illustrative force vs. separation distance profiles (black circles) measured by SMFS upon withdrawal of several AFM-probes (functionalized with YadC, YadN antibodies, xylose (Xyl), galactose (Gal), lactose (Lac) and mannose (Man)) from *E. coli* Δ_{adh} cell wall. This figure clearly evidences the absence of adhesion and accordingly there is no modelling of the data reported here.

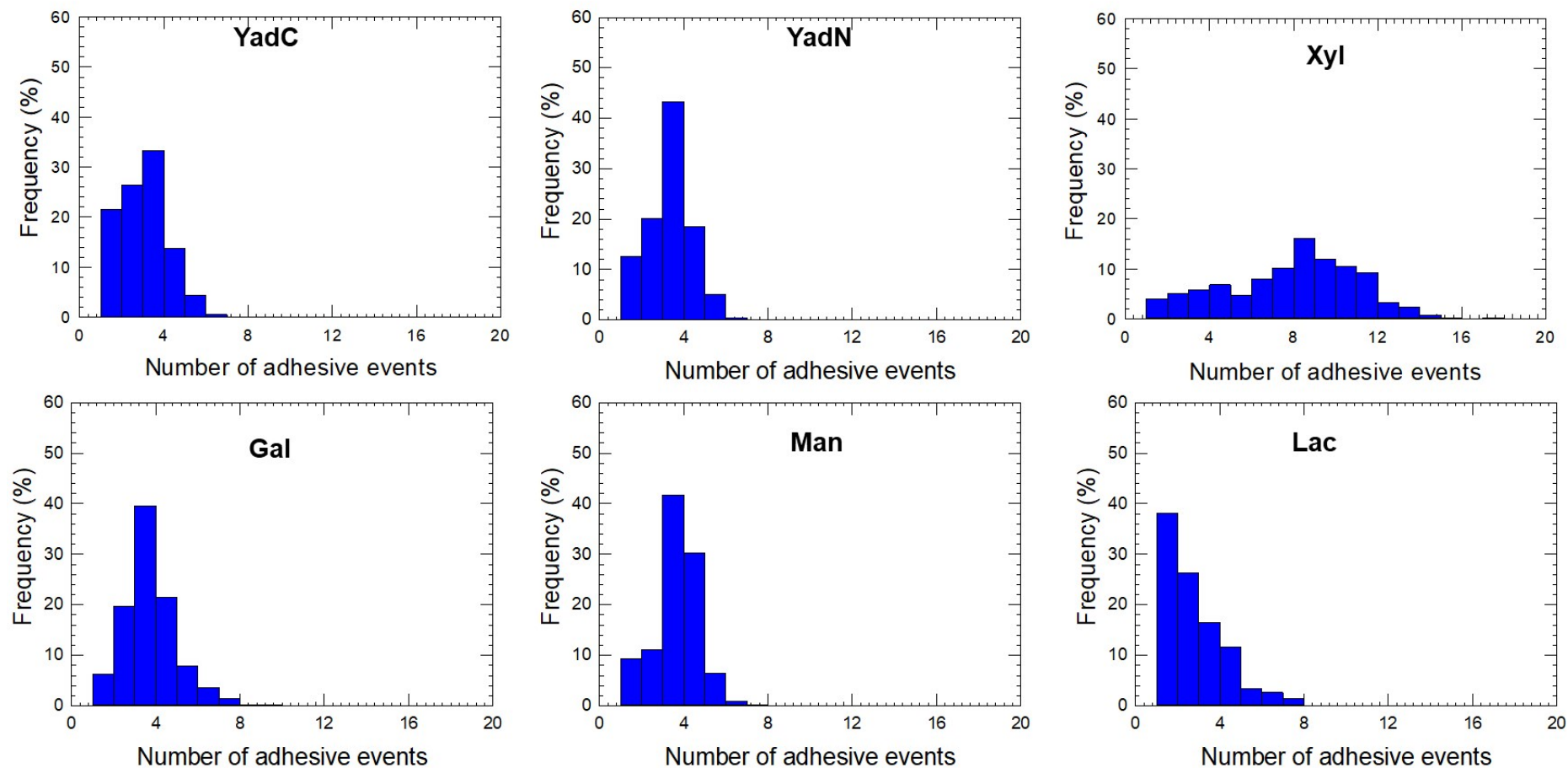


Figure S6. Statistic distribution of the number of adhesive events estimated from the SMFS force-distance curves measured for *E. coli* Δ_{adh_PcLyad} interacting with AFM-probes functionalized with YadC, YadN antibodies, xylose (Xyl), galactose (Gal), lactose (Lac) and mannose (Man) (indicated).

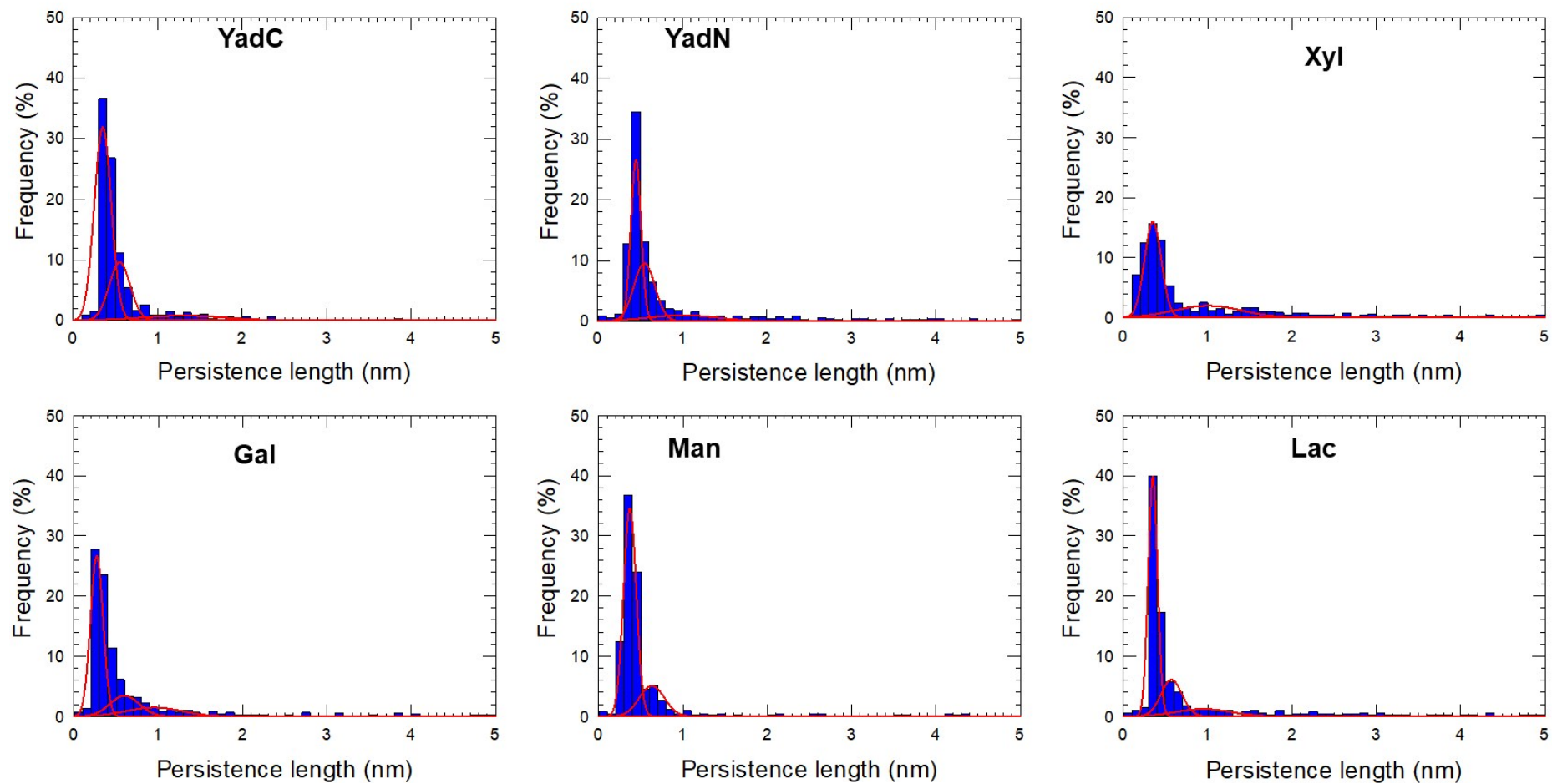


Figure S7. Statistic distribution of the persistence length of Yad fimbriae estimated from the SMFS force-distance curves measured for *E. coli* Δ_{4adh_PcLyad} interacting with AFM-probes functionalized with YadC, YadN antibodies, xylose (Xyl), galactose (Gal), lactose (Lac) and mannose (Man) (indicated). Red lines correspond to decomposition of the distribution into fundamental Gaussian components.