ELECTRINIC SUPPORTING INFORMATION

Fast automated processing of AFM PeakForce curves to evaluate spatially resolved Young modulus and stiffness of turgescent cells

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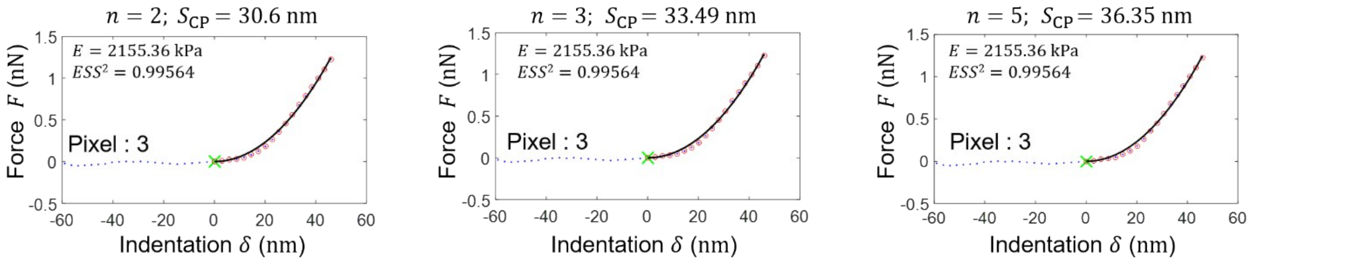

Fig. S1 Illustration of the impact of σ (indicated) on Young modulus derived here from Sneddon model with becc correction (given in force *versus* indentation representation). The quantity F_c corresponds to the value of the force defined by $F_c = \bar{F} + n\sigma$ with here $n = 2, 3$ and 5 from the left to the right panel.

Bruker value	**Value derived from analysis of 10 curves**
$E_{\mathrm{Bruker}} = 2.5 \pm 0.7$ MPa	$E = 2550.4 \pm 207.2$ kPa

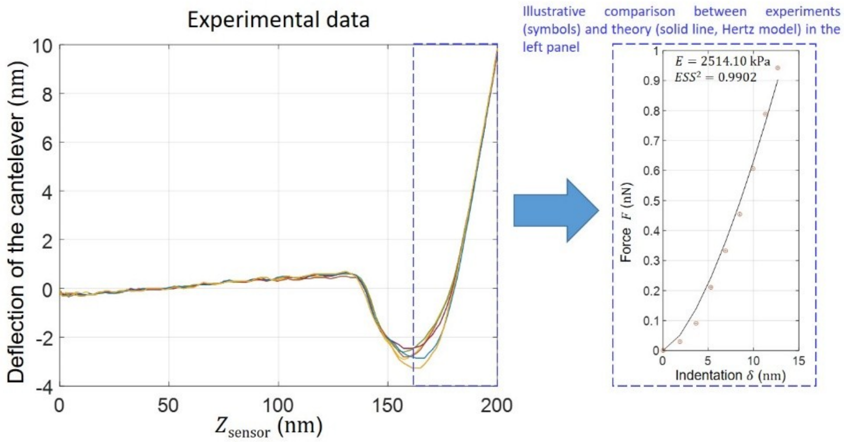

Fig. S2 Evaluation of Young modulus for polydimethylsiloxane (PDMS) surface provided by Bruker company for calibration purpose. We adopted the Hertz model without Dimitriadis correction (and without considering compliance regime, inapplicable to PDMS), and we used a probe radius of 20 nm for computations with the Bruker software and with our own software. Both lead to identical Young modulus value, further in line with tabulated value for PDMS. In addition, given the thickness of the PDMS sample (150 µm, as specified by the manufacturer), we verified that the account of Dimitriadis correction does not impact on the obtained

Young modulus.

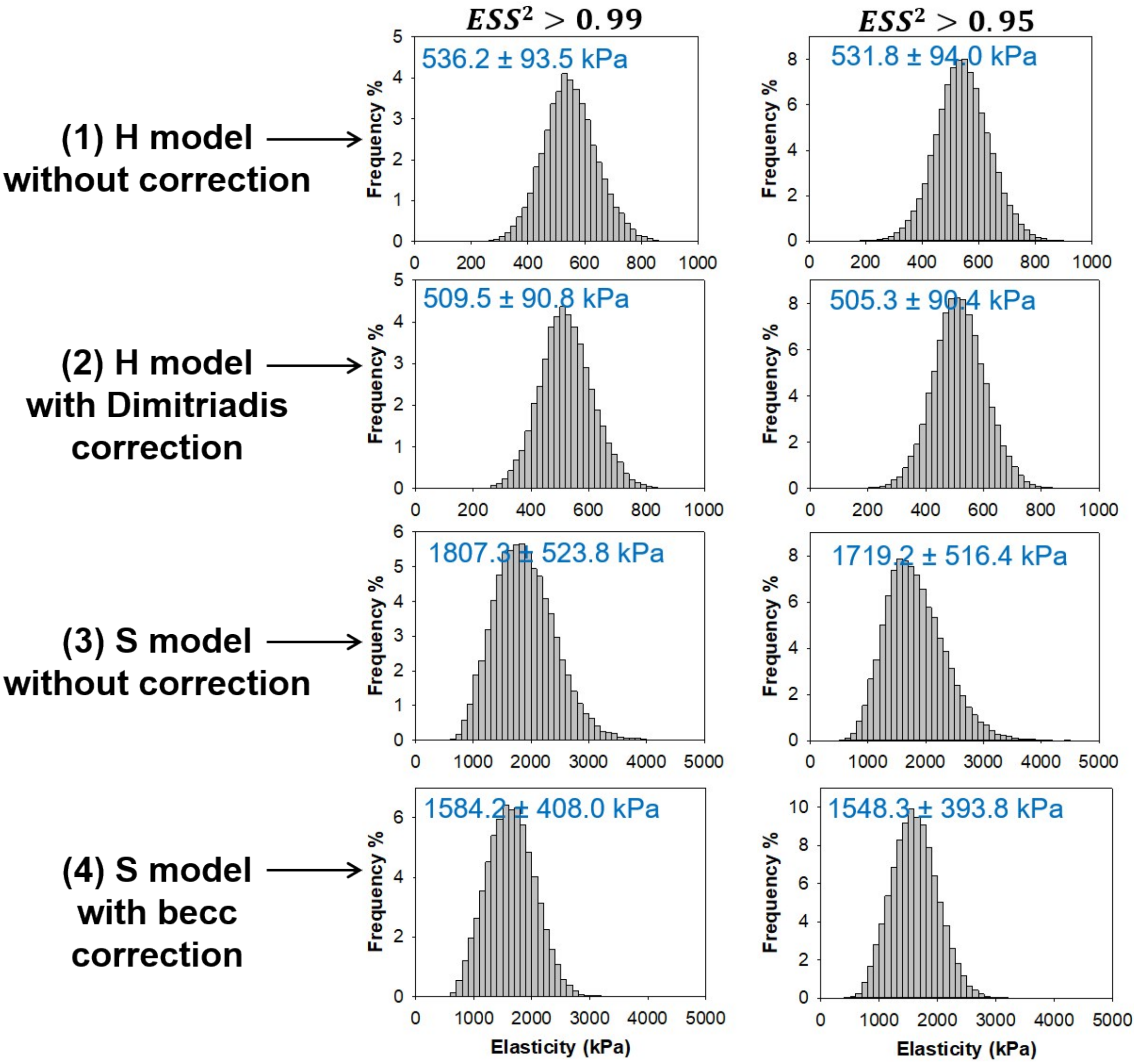

Fig. S3 Histograms of Young' modulus E corresponding to the spatial maps displayed in Fig. 8 of the main text. Means and standard deviations are specified. Results are given for error sum of squares larger than 0.99 and 0.95 (indicated). See text for details.

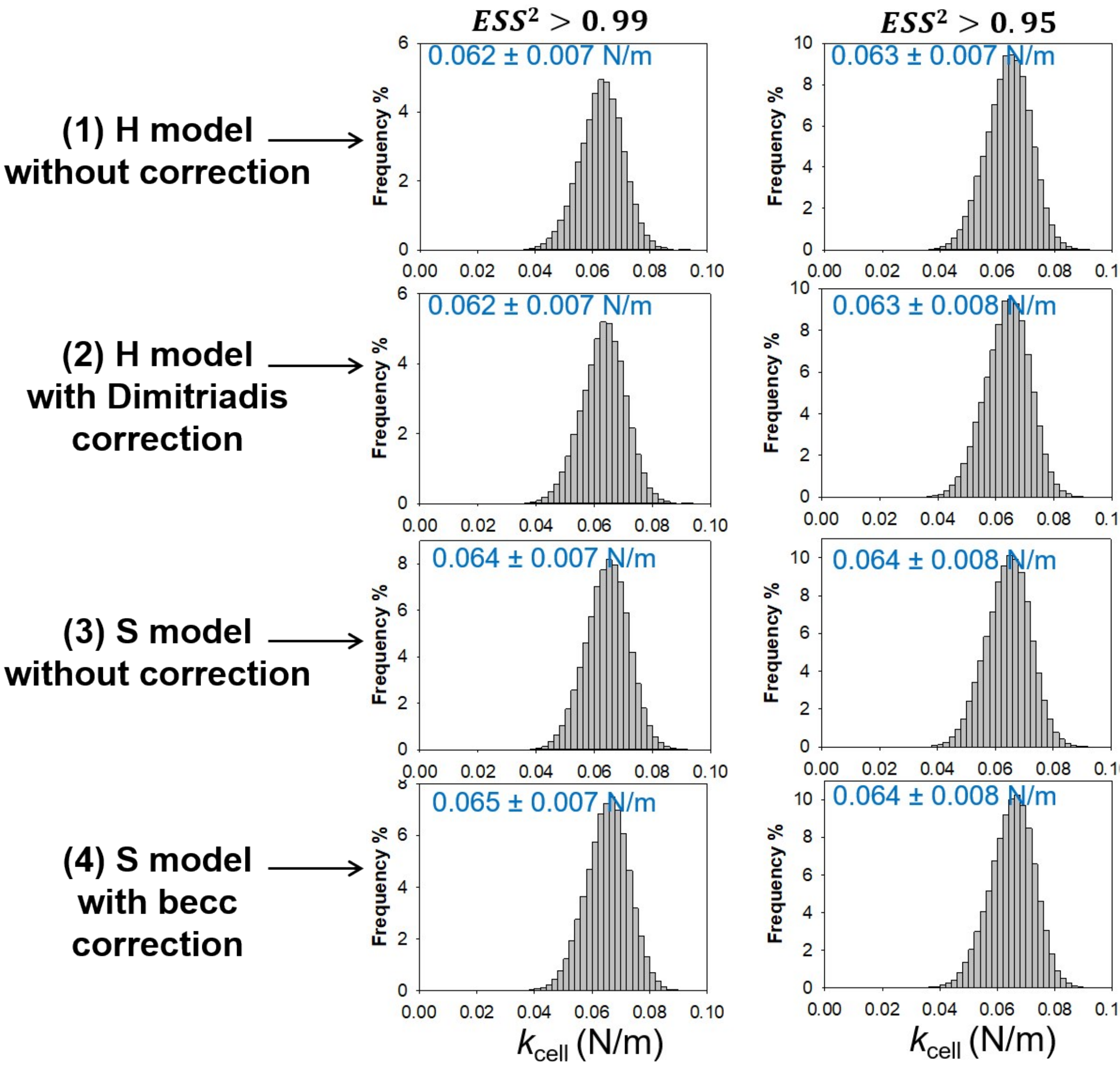

Fig. S4 Histograms of cell stiffness k_{cell} corresponding to the spatial maps displayed in Fig. 12 of the main text. Means and standard deviations are specified. Results are given for error sum of squares larger than 0.99 and 0.95 (indicated). See text for details.

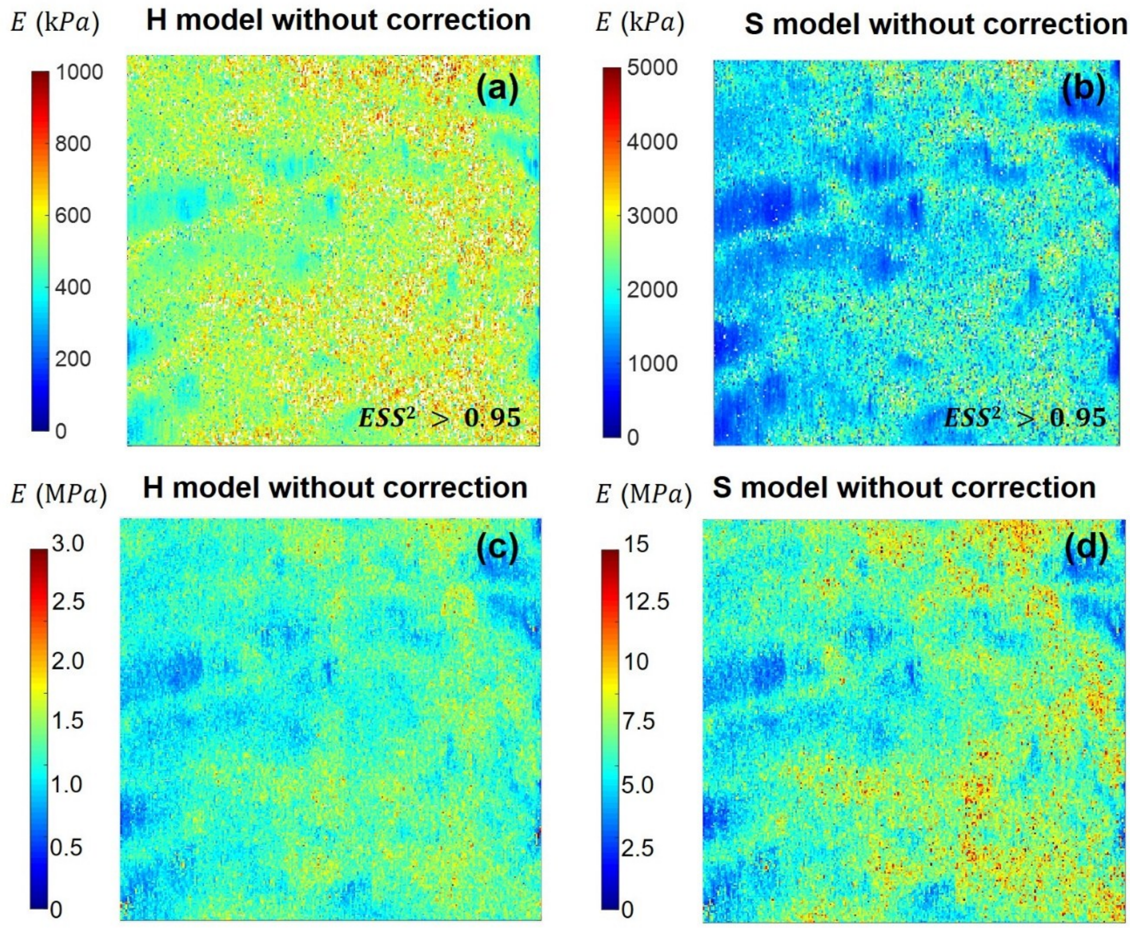

Fig. S5 Comparison between Young moduli maps generated with our software according to (H) and (S) model without finite sample thickness correction and with full modeling of the linear compliance regime ((a) and (b), respectively), and corresponding maps constructed with use of offline Bruker software analysis ("Run AutoProgram'' option with "baseline correction", panels (c)-(d) (no sample thickness correction and no account of the linear compliance regime via Hook's law). Panels (c)-(d) were constructed using a $[Fmin - Fmax]$ forces range (where data were fitted to a non-linear nanomechanical model) that corresponds to $0 - 40\%$ of the maximum loading force, *i.e.* here *ca.* 0 to $2\,nN$. *N.B.* We experienced difficulties to treat at once all 65536 force curves with use of Bruker software: only packets of *ca.* 5000 force curves could be treated in a row (corresponding treatment time of ca. 2.5 hours), which considerably increases the overall data treatment time and further requires re-assembling all analyzed data packets for generating the end spatial maps of the desired parameters (total time required for a complete map construction is *ca.* 33 hours, to be compared with our $25\,min$ using our software). If submitting a too large number of curves to treatment, Bruker software crashed (without having saved any of the data treated in the stage preceding the crash). Our software does not suffer from these limitations. It is noted that fixing the $[Fmin - Fmax]$ forces range to $0 - 18\%$ of the maximum loading force (which corresponds to a force range of 0 to $1\,nN$) leads to significantly different Young moduli maps and poorer fitting to nanomechanical model (not shown). We acknowledge that Bruker offers the possibility of online Young moduli maps generated rapidly within few seconds. However, we did not exploit this ''press button strategy'' because we did not find out a way to figure out the goodness of the data fitting for each force curve, the precise location of the contact point, and clear definitions of the indentation domains *and* force ranges where fitting is truly performed. In our view, the offline analysis by Bruker offers better options to address these points for controlled quantitative analysis.

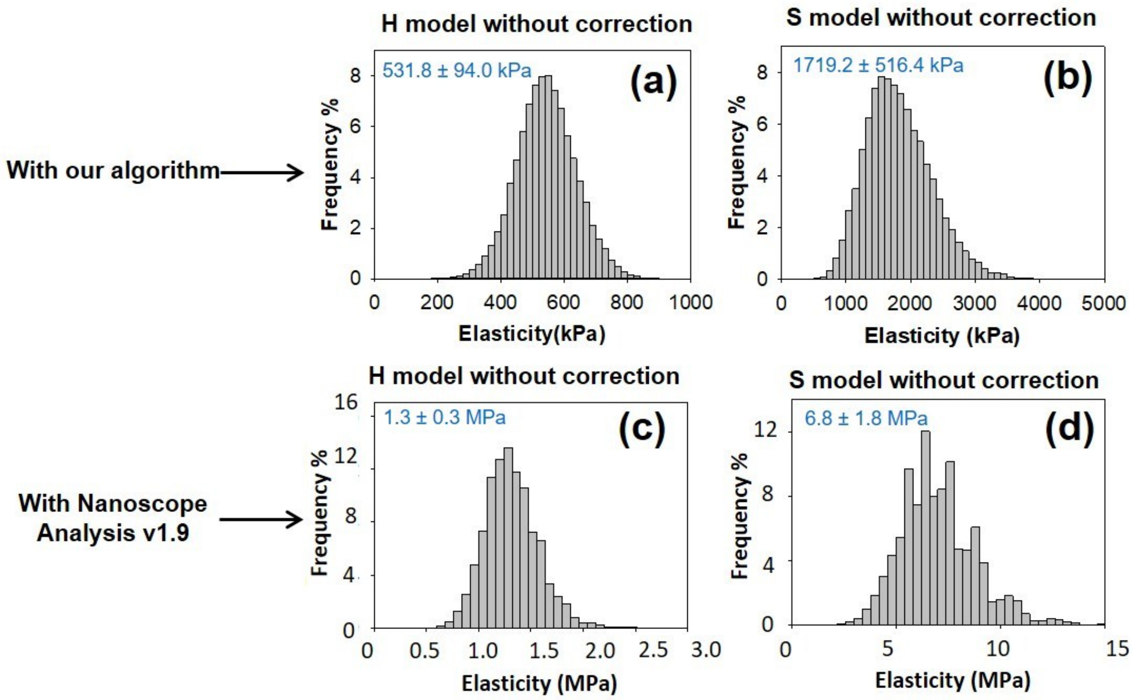

Fig. S6 Distribution histograms of Young moduli corresponding to the spatial maps reported in Fig. S5.

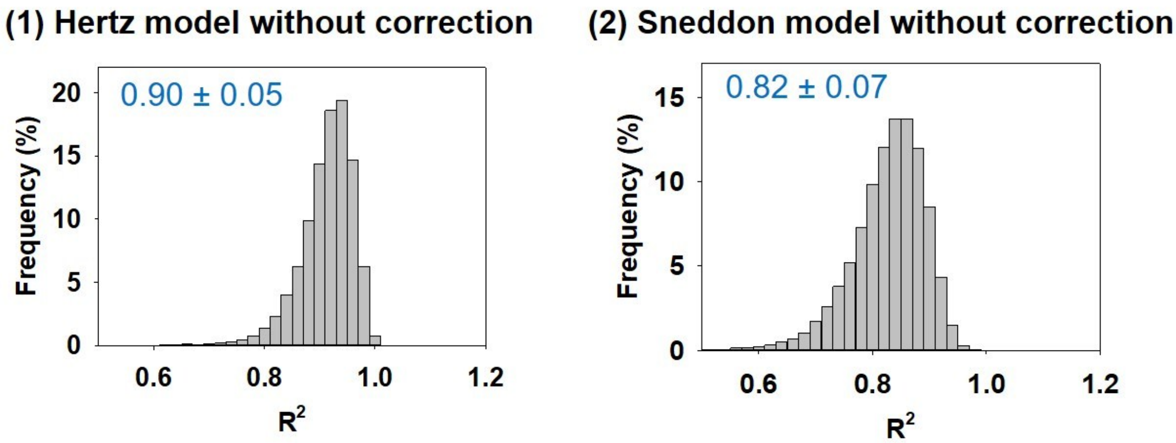

Fig. S7 R^2 histograms reflecting the data fitting goodness with (H) and (S) models using Nanoscope Analysis v1.9. These histograms correspond to the data given in Fig. S5 (c)-(d) and Fig. S6 (c)-(d). For the sake of comparison, the result ESS^2>0.95 applies to 91% and 97 % of the force curves when treated according to our algorithm without final sample thickness correction in the H and S models and with proper modelling of the linear compliance regime (see Figures 8(b) and 8(d), respectively).