Electronic Supplementary Material (ESI) for Soft Matter.

Supplementary

Pressure Sensitive Microparticle Adhesion through Biomimicry of the Pollen-Stigma Interaction

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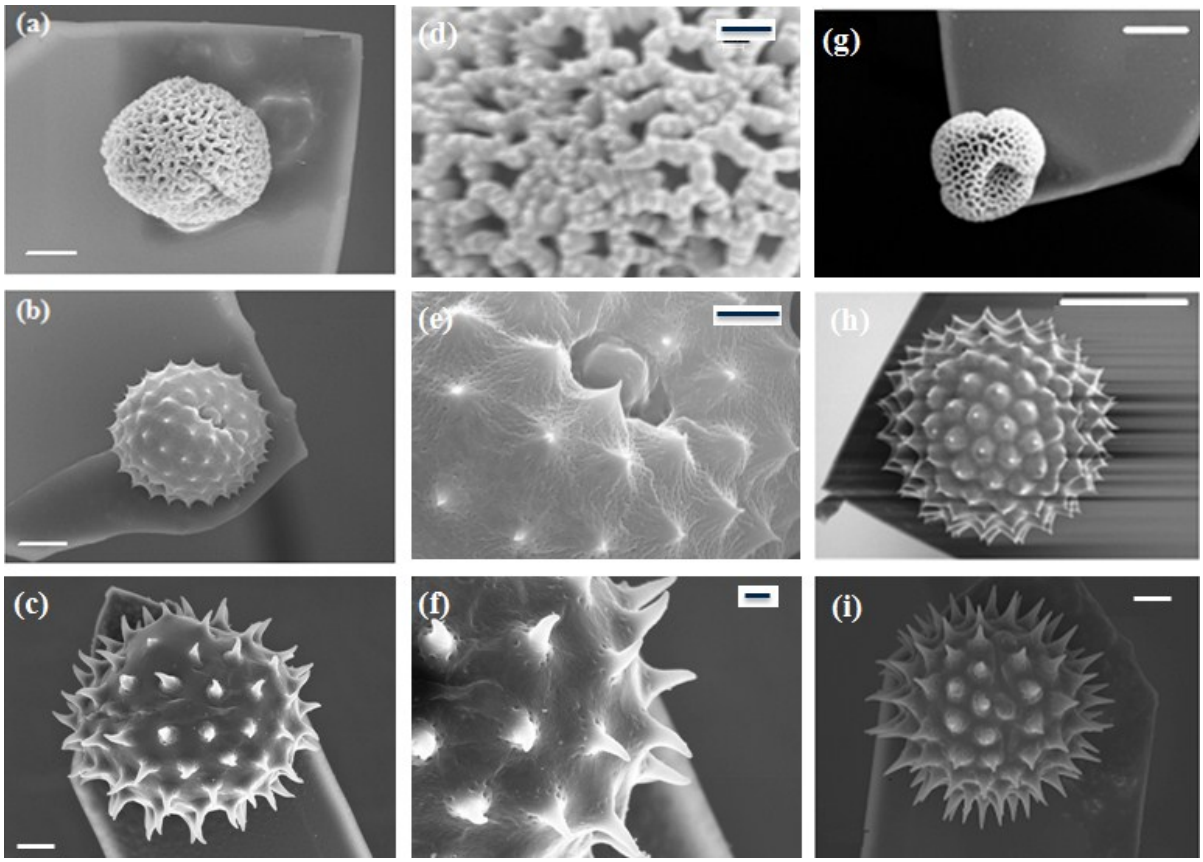

Figure S1. SEM images of AFM colloidal-probes of the pollen grains glued to the end of tipless AFM cantilevers. (a) and (d) are the native olive pollen particles; (b) and (e) are the native ragweed pollen particles; (c) and (f) are the native sunflower pollen particles; (g), (h), and (i) the clean particles of olive, ragweed and sunflower pollens respectively. The white scale bar represents 10 μm and the black scale bar is 1 μm.

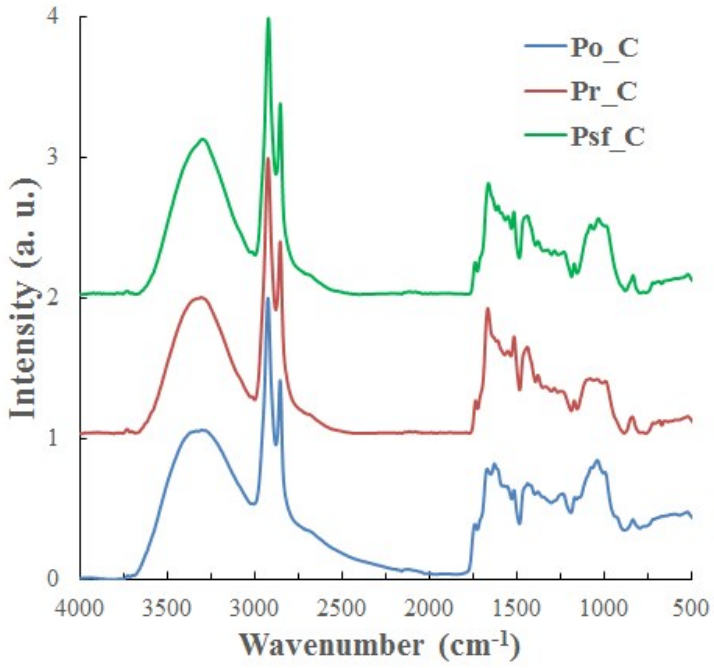

Figure S2. FTIR spectra of each cleaned pollen particles.

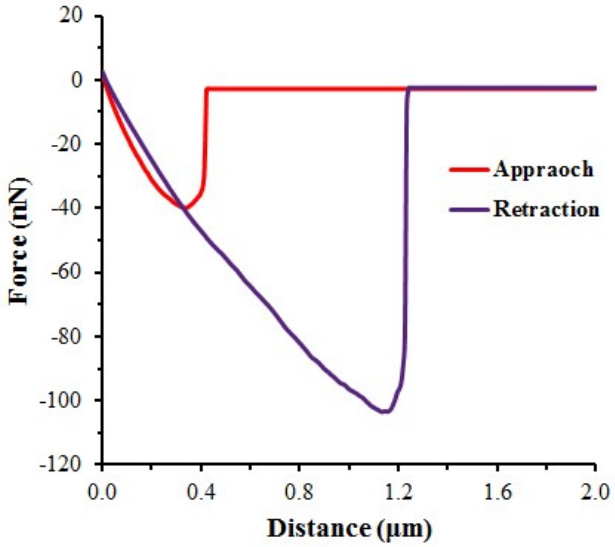

Figure S3. A typical force-distance curves for the interactions of a clean sunflower pollen AFM probe (Psf_C, spring constant 0.5 N/m) and a flat PDMS substrate at 2.5 nN load forces: the gradient in the contact region was 0.08 ± 0.01 N/m.

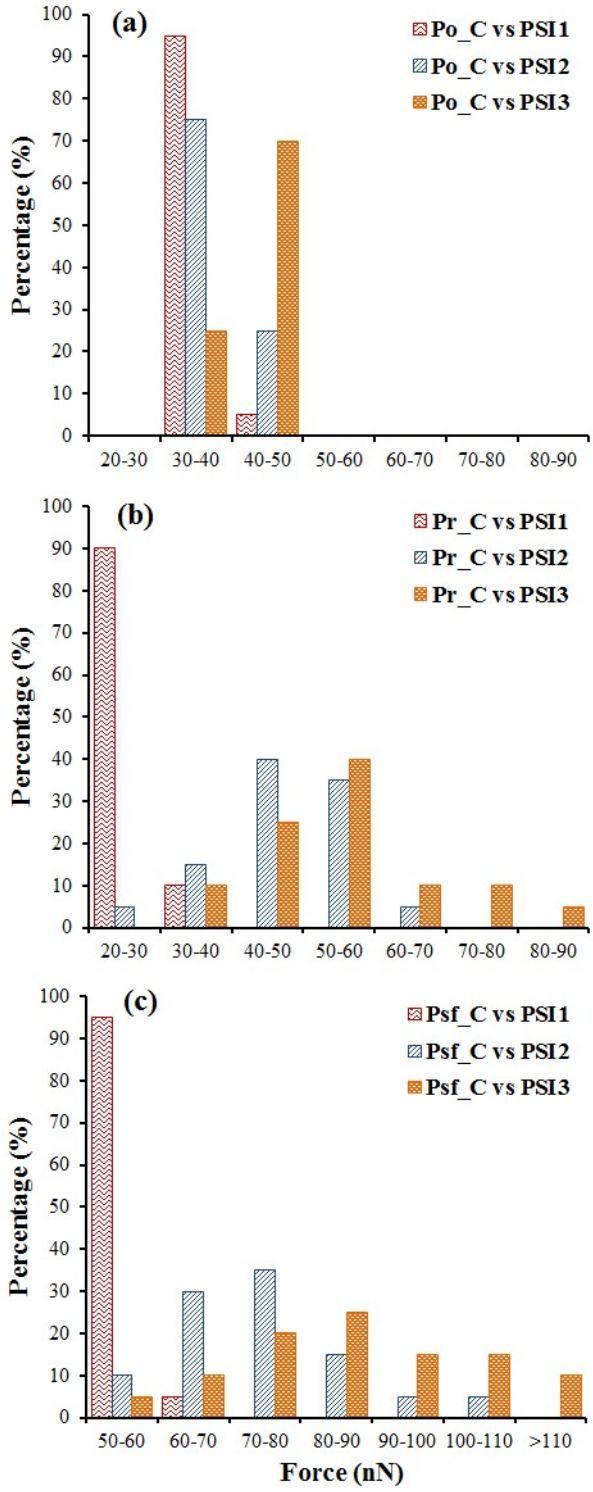

Figure S4. Force-distributions for the interactions of pollen AFM probes (a: Po_C; b: Pr_C; c: Psf_C) with three PSI-PS substrates under 2.5 nN load force.

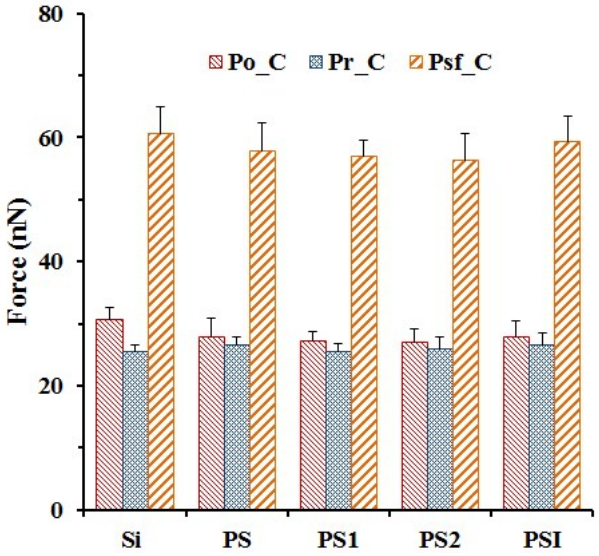

Figure S5. Adhesion forces for three clean pollen particles of each species (Po_C, Pr_C and Psf_C) interacting with five different substrate surfaces (Si, PS, PS1, PS2 and PSI) under load force 2.5 nN. Error bars are 95% confidence intervals.

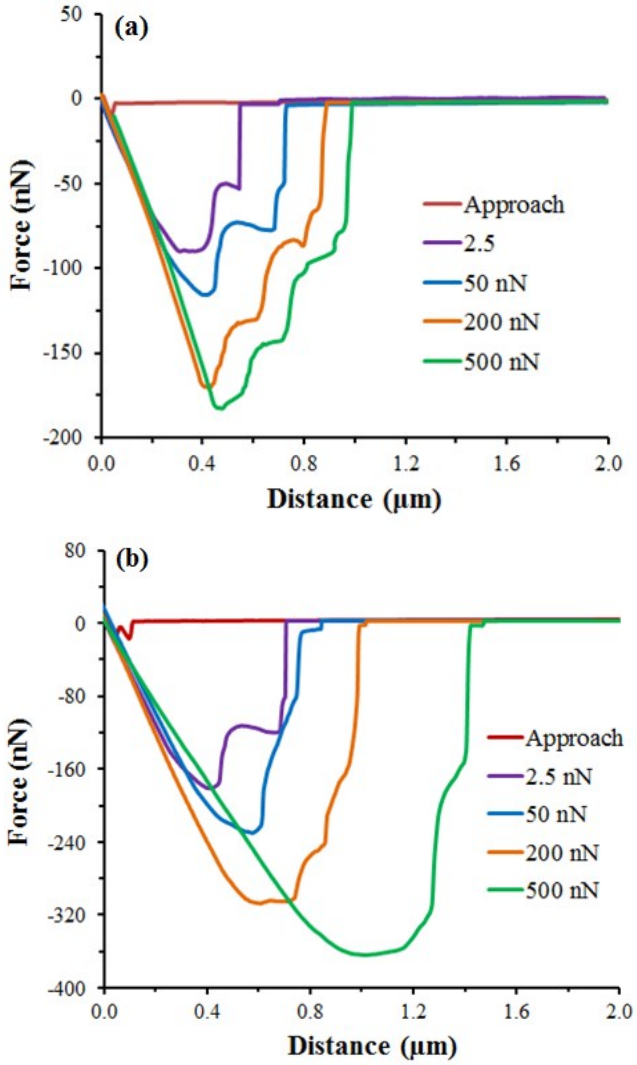

Figure S6. Force-distance curves for the interactions of sunflower pollen AFM probes (a: Psf_C; b: Psf_N) and PSI3 substrate at a series of load forces.

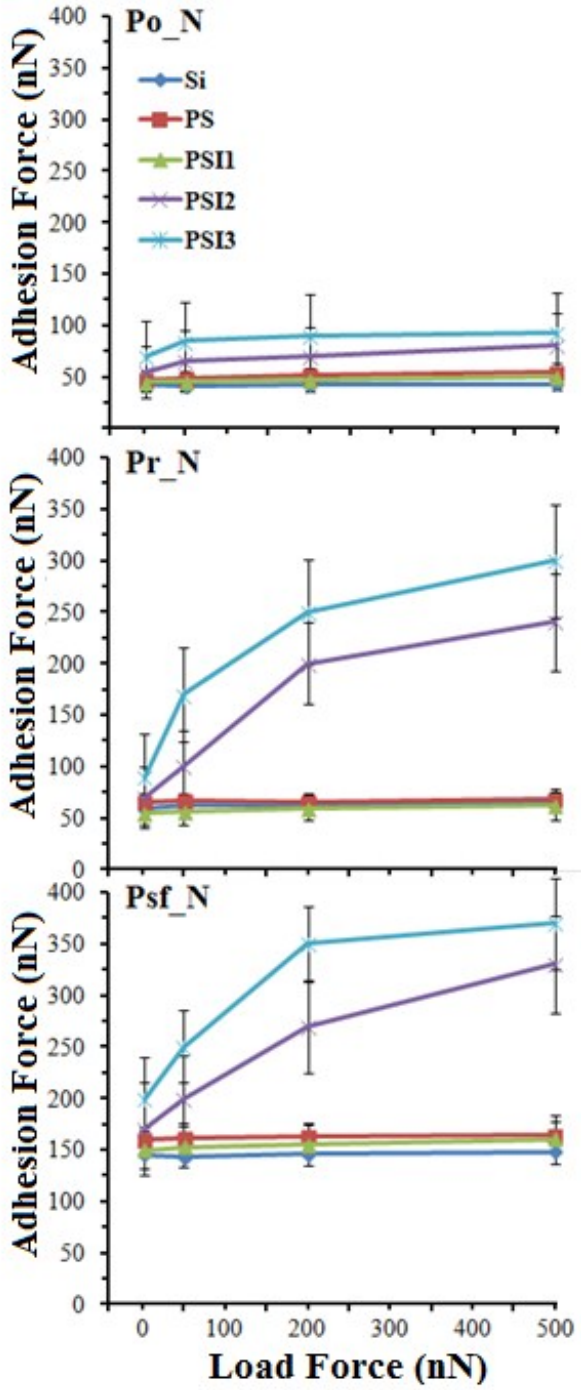

Figure S7. Adhesion forces versus load forces for the native pollen particles interacting with five different substrate surfaces. Error bars are 95% confidence intervals.

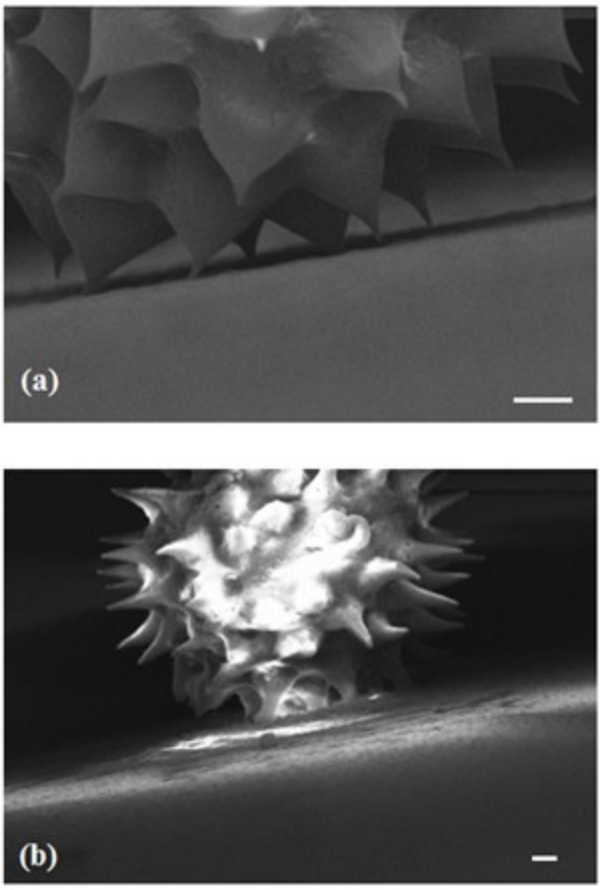

Figure S8. SEM images showing the multiple spines contact to surfaces for freely-settling (a) ragweed and (b) sunflower pollen particles on Si substrates. All scale bars are 1μm.

Table S1. Possibility (*p*-value) of no significant difference of adhesion forces between each substrates under 2.5 nN and 500 nN load forces.

p-value	Po_C	Pr_C	Psf_C
2.5 nN Load Force			
PS-PSI1	0.13	0.32	0.63
PS-PSI2	8.8×10^{-4}	2.1×10^{-4}	2.5×10^{-3}
PS-PSI3	4.4×10^{-7}	1.2×10^{-8}	2.8×10^{-8}
PSI1-PSI2	3.0×10^{-7}	2.2×10^{-10}	3.4×10^{-11}
PSI1-PSI3	1.0×10^{-10}	1.2×10^{-12}	1.5×10^{-13}
PSI2-PSI3	0.19	0.16	0.22
500 nN Load Force			
PS-PSI1	0.45	0.65	0.86
PS-PSI2	3.7×10^{-3}	5.5×10^{-3}	4.3×10^{-4}
PS-PSI3	4.6×10^{-5}	3.3×10^{-6}	5.0×10^{-7}
PSI1-PSI2	2.3×10^{-7}	3.4×10^{-8}	2.4×10^{-11}
PSI1-PSI3	2.1×10^{-11}	7.2×10^{-10}	2.8×10^{-13}
PSI2-PSI3	0.12	0.08	0.09