

Supporting Information for

Observing Real-Time Adhesion of Microparticles on Glass Surfaces

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SUPPORTING INFORMATION CONTENT

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ANNEXURE 1

MATLAB code used for calculating feret diameter

SUPPORTING INFORMATION VIDEO

SV-1: Video depicting a particle adhesion on glass

SV-2: Video showing a particle traveling from the depth and adhering to the glass

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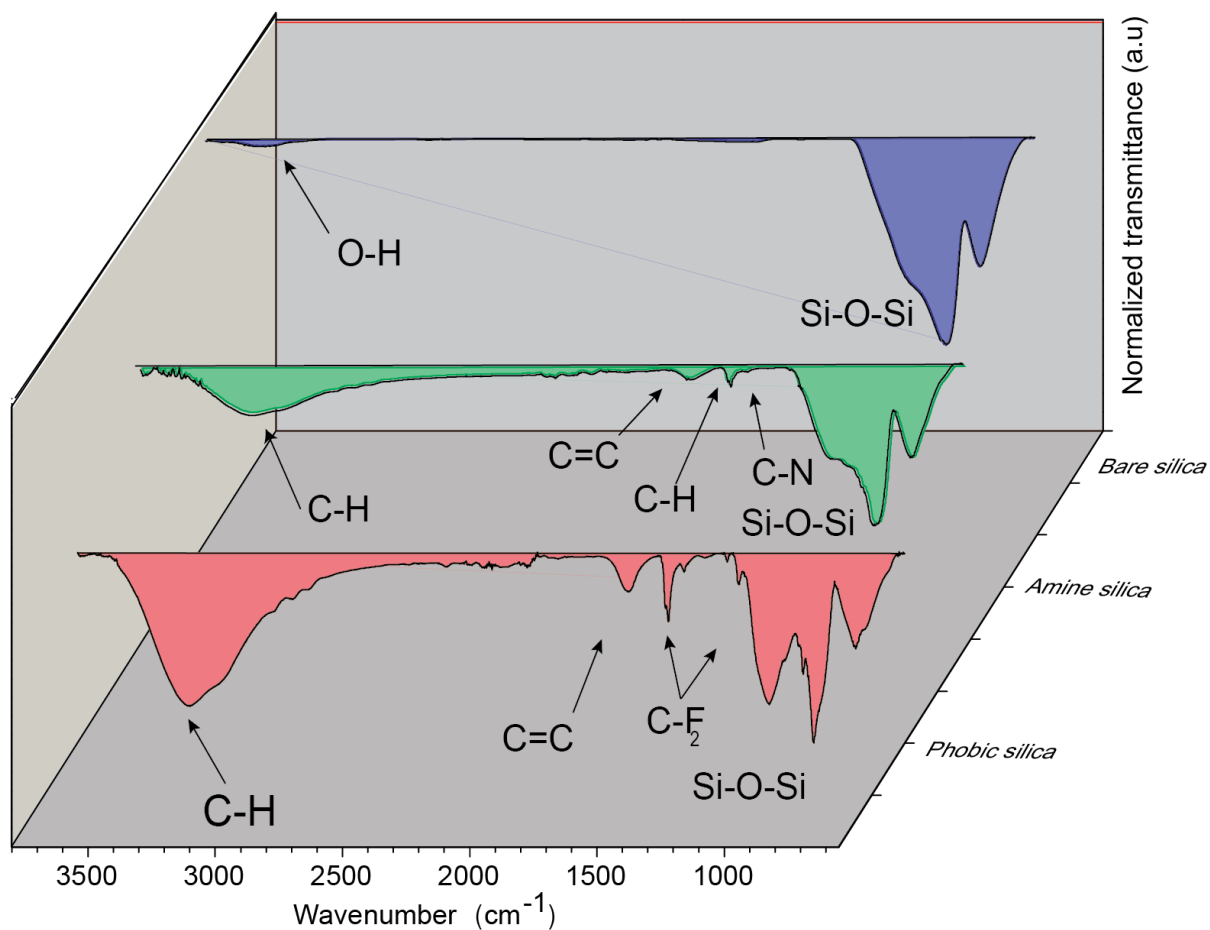


Figure S1. FT-IR spectra of bare, amine functionalised, and hydrophobic silica. Various vibrations are assigned.

Table S1. FTIR assignment for bare, amine, and hydrophobic silica particles.

Wavenumber (cm ⁻¹)	Bare SiO ₂	Amine @ SiO ₂	Phobic @ SiO ₂	Assignment
1000	Yes	Yes	Yes	Si-O-Si ²
840	No	Yes	Yes	Si-O-C deformation ³
1100	No	Yes	Yes	Si-O-C stretching ³
1138	No	No	Yes	C-F ₃ stretching ⁴
1190	No	No	Yes	C-F ₂ stretching ⁴
1214	No	Yes	No	C-N stretching
1463	No	Yes	Yes	C-H bending
1650	No	Yes	No	N-H bending
3267	No	Yes	Yes	C-H stretching

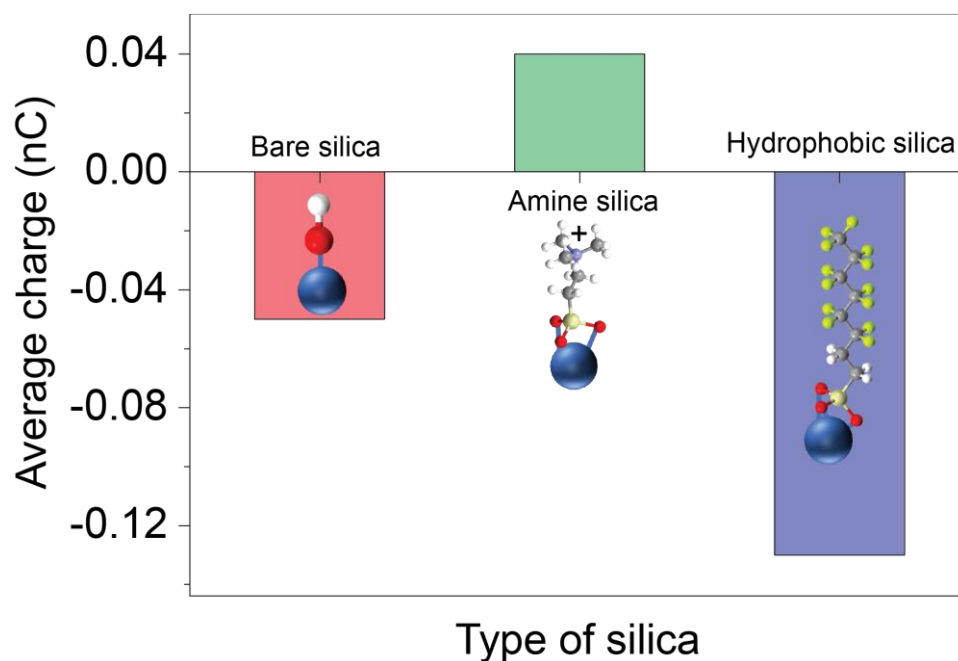


Figure S2. Charge distribution of bare, amine, and hydrophobic silica particles. (Inset) Schematic representation of the moieties, blue ball represents silica particle, red and white represent oxygen and hydrogen, respectively. Grey, green and light blue color represent fluorine, carbon and nitrogen, respectively. The largest ball represents silica particle.

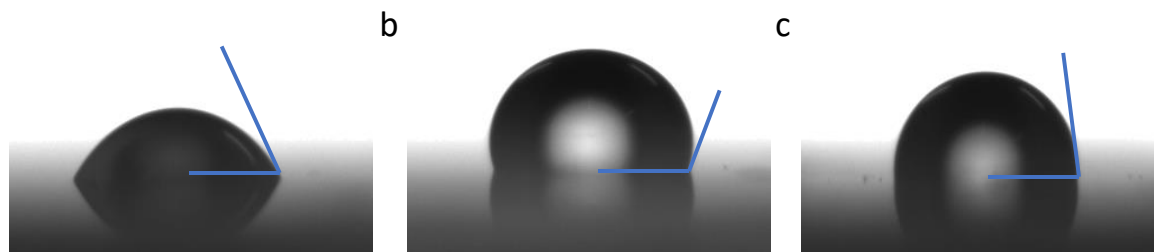


Figure S3. Contact angle measurements performed on (a) hydrophilic, (b) hydrophobic, and (c) amine functionalized glass.

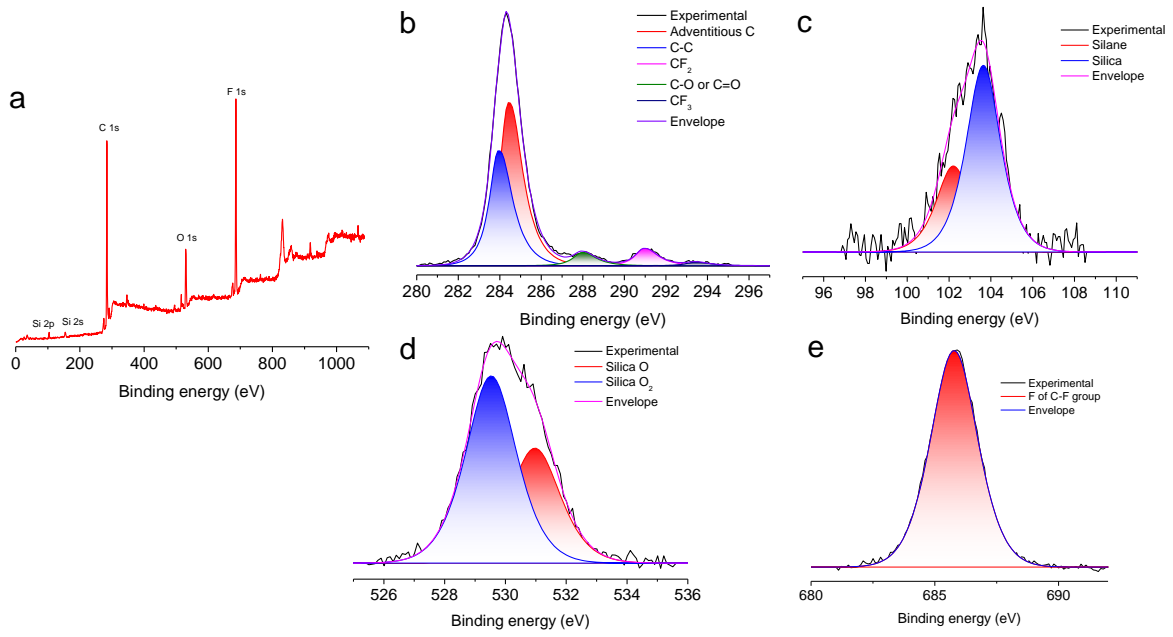


Figure S4. (a) XPS survey spectra of hydrophobic glass. Expanded region of (b) C, (c) Si, (d) O₂ and (e) F.

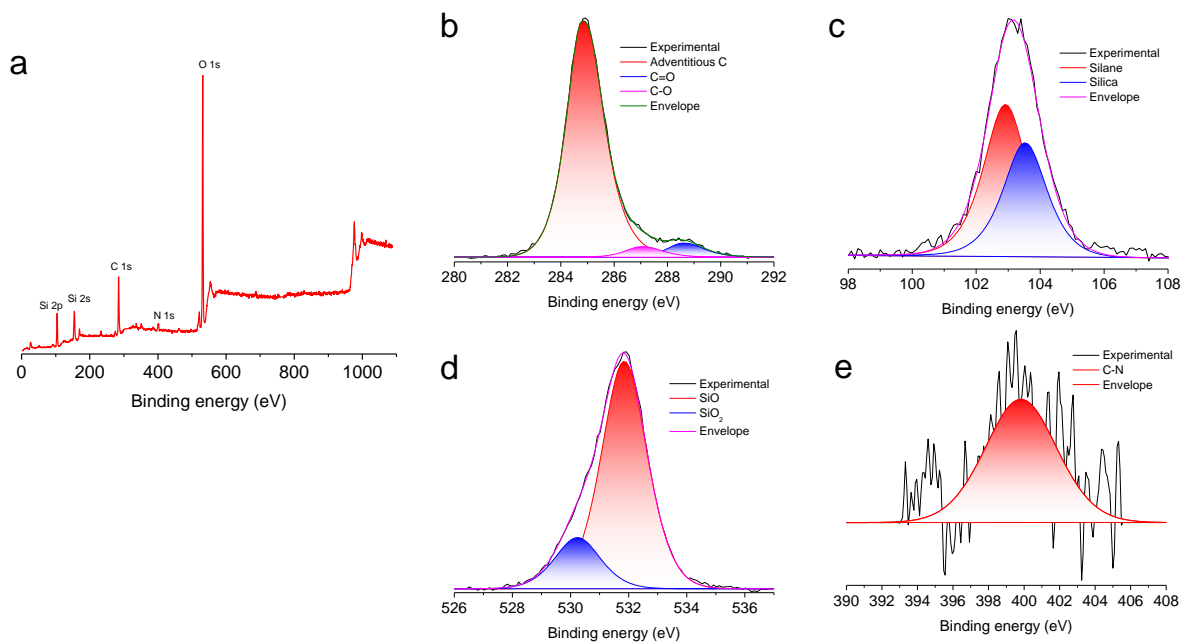


Figure S5. (a) XPS survey spectra of TMA-treated glass. Expanded regions of (b) C, (c) Si, (d) O and (e) N.

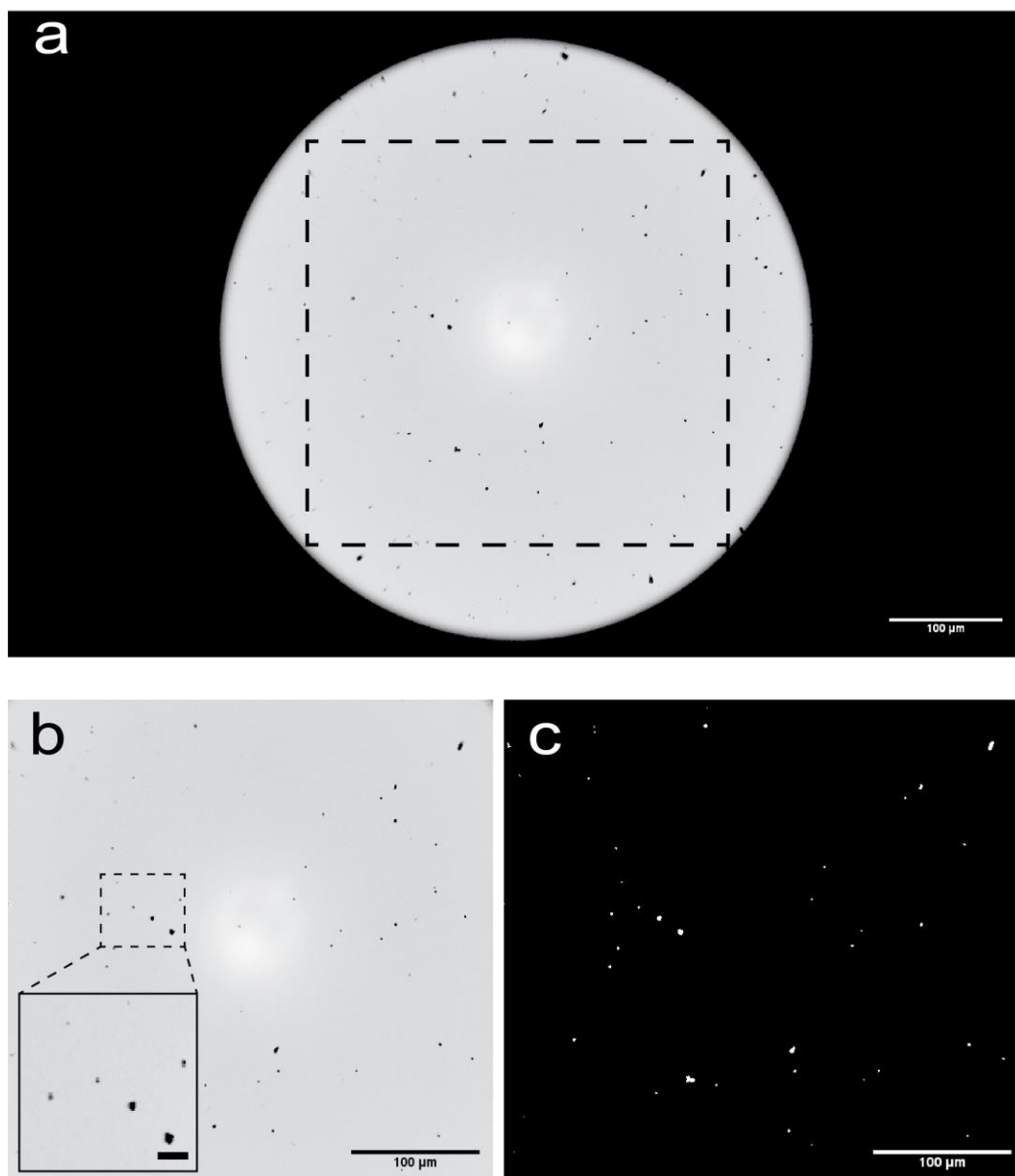


Figure S6. Optical image from the high-speed camera, (a) boxed region depicts the region of interest (ROI), (b) ROI cropped from the image, (inset) shows an enlarged region to show the particles adhered on glass and scale bar corresponds to 10 μm , and (c) after color inversion.

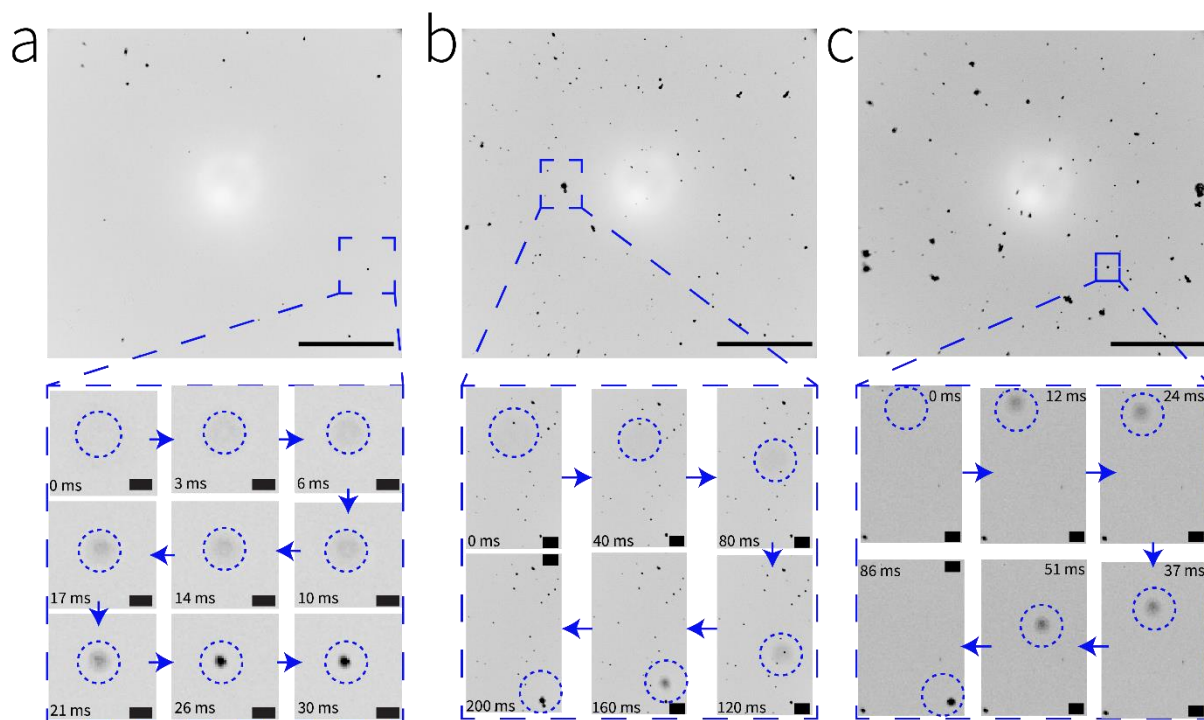


Figure S7. Digital photographs from the high-speed camera. Interaction of positive, control, and negatively charged particles on hydrophobic glass is shown in (a, b and c, respectively). Scale bar corresponds to 100 μm . For all the magnified images, the scale bar is 10 μm .

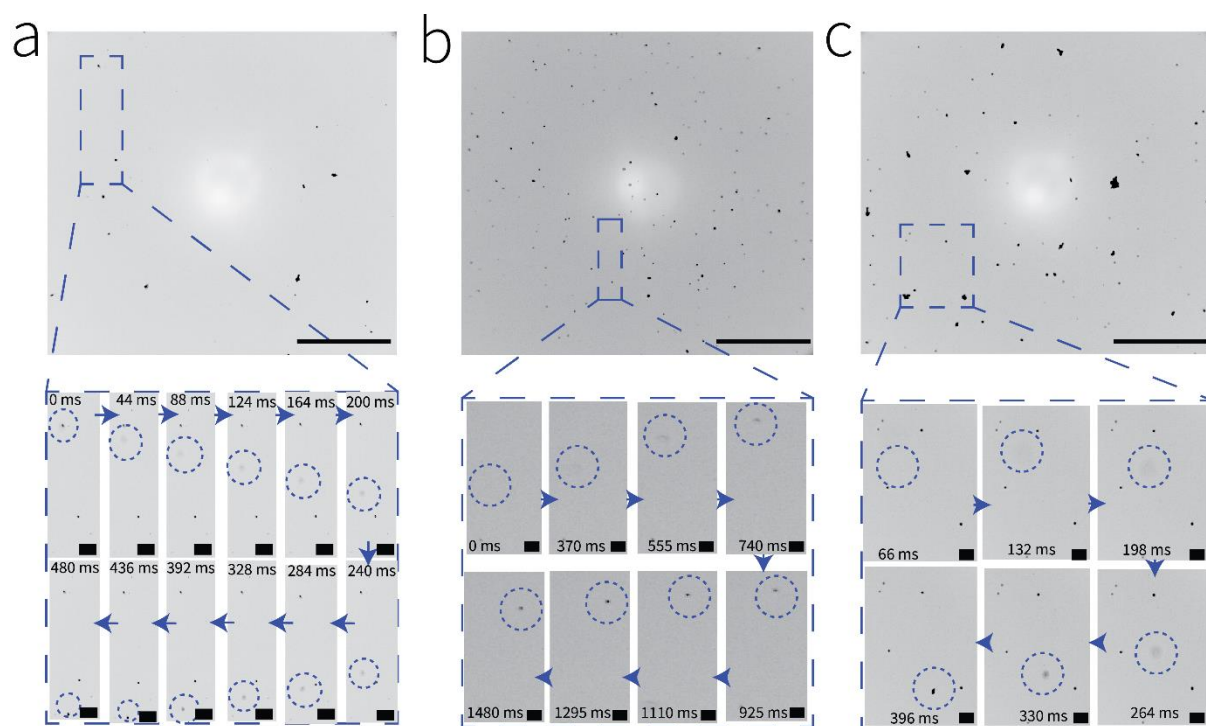


Figure S8. Digital photographs from the high-speed camera. Interaction of positive, control, and negatively charged particles on amine-functionalized glass is shown in (a, b and c, respectively). Scale bar corresponds to 100 μm. For all the magnified images, the scale bar is 10 μm.

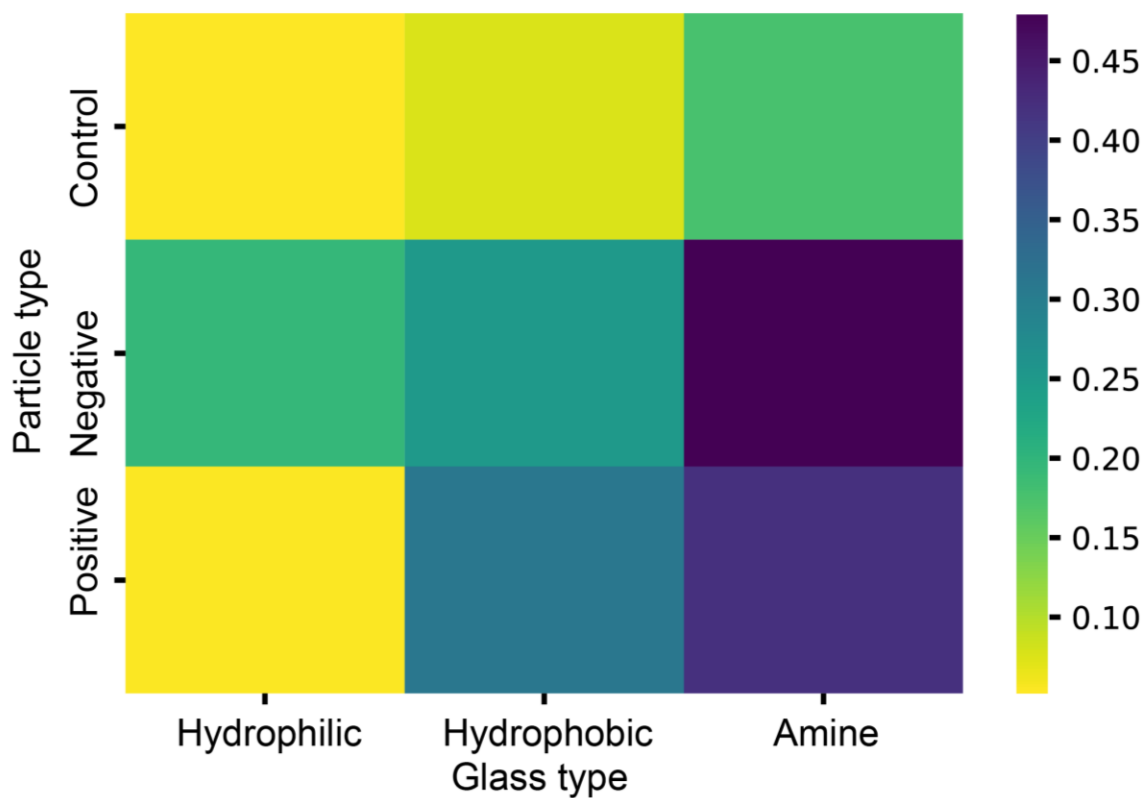


Figure S9. Heat-map representing the median time needed for particles to adhere on different functionalized surfaces. Scale bar on the right represent the time in seconds.

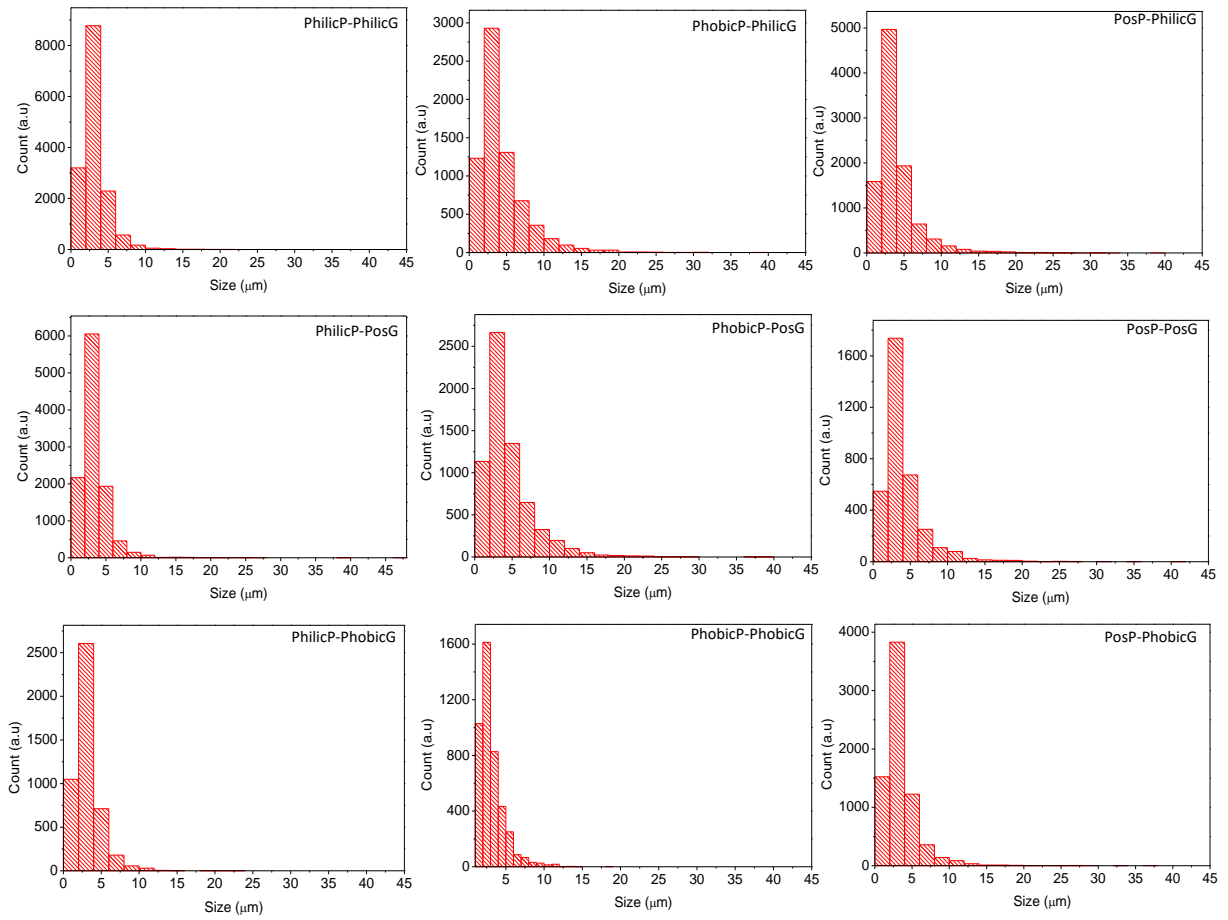


Figure S10. Particle size distribution on functionalized glass after the adhesion of silica particles.

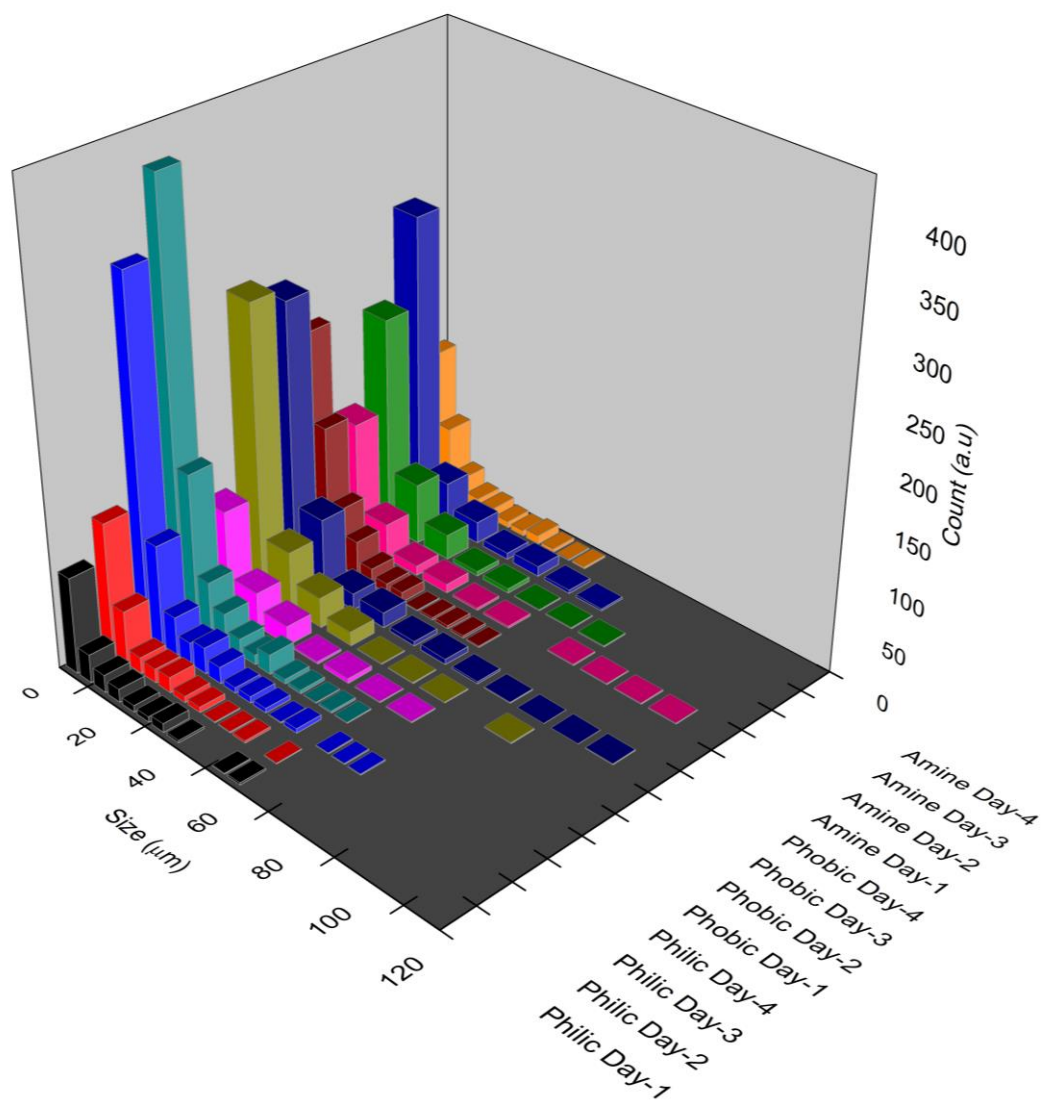


Figure S11. Size-distribution of deposited dust on functionalized glass every day.

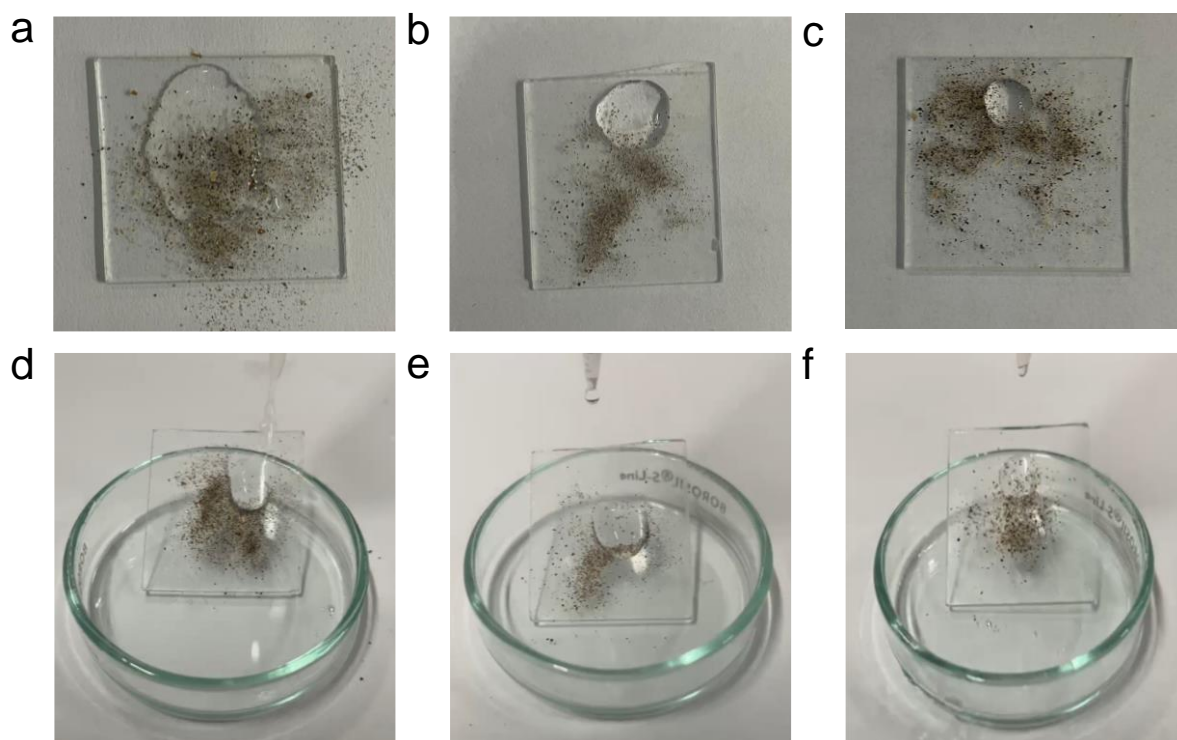


Figure S12. Digital photographs of water droplet on foiled (a) hydrophilic, (b) TMA-treated and (c) hydrophobic glass surfaces. Droplet interaction on slanted (d) hydrophilic, (e) TMA-treated and (f) hydrophobic glass surfaces. All surfaces are with sand.

References

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